REPORT OF THE SPICES ENQUIRY COMMITTEE

I.C.A.R.

C.F.T.R.I.

CFTRI-MYSORE
3531
Report of the sp

Indian spices,

Indian Spice industry,

Pepper, Cardamoms, Gingers,
Turmeric, Cashew nuts.
Lemongrass oils.

REPORT

of the

SPICES ENQUIRY COMMITTEE

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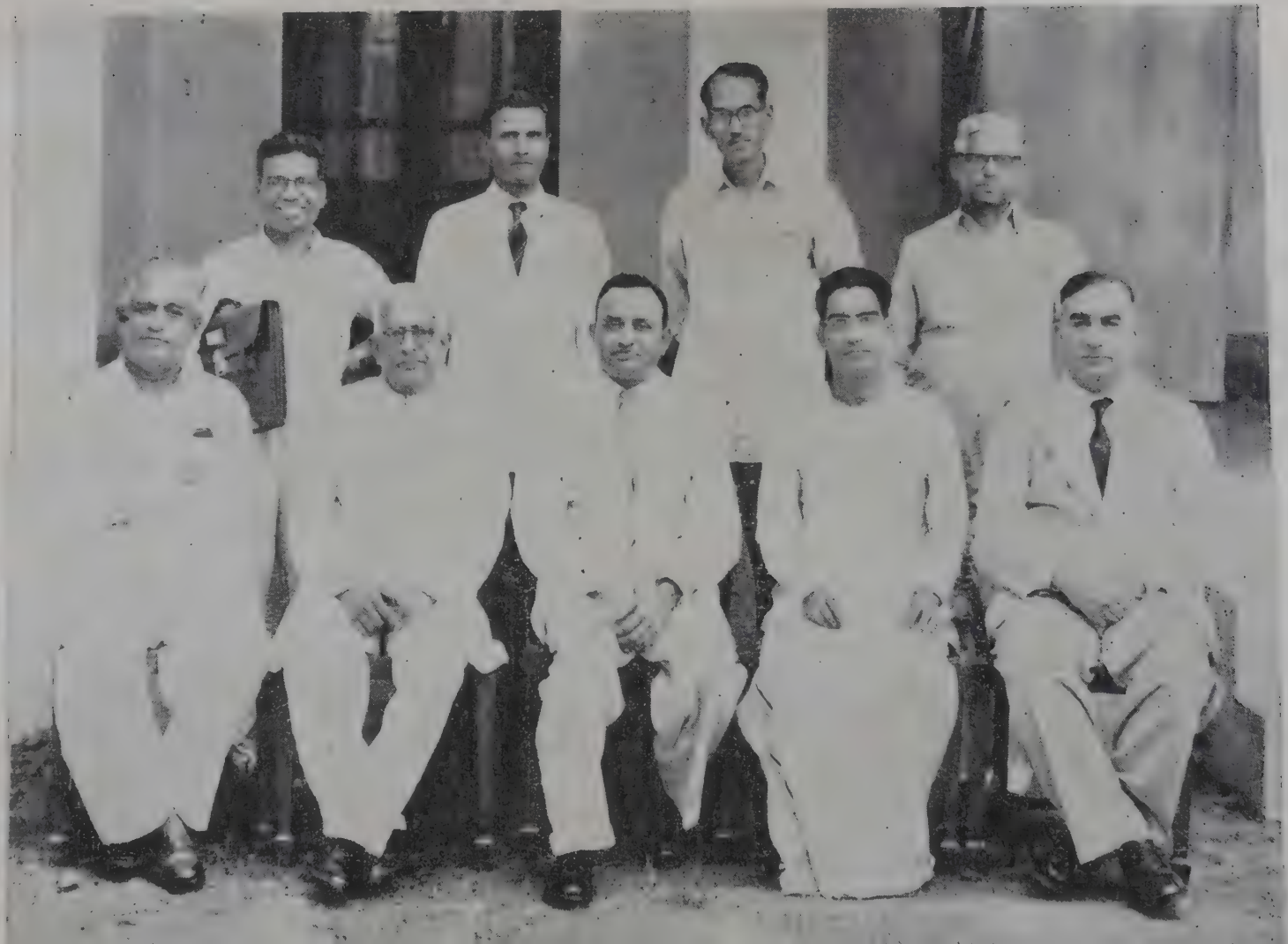

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INTRODUCTION

We, the members of the Spices Enquiry Committee appointed by the Indian Council of Agricultural Research, have the honour to submit herewith our report on the terms of reference forwarded to us.

Early in 1951, the Planning Commission brought to the notice of the Ministry of Food and Agriculture that the attention paid to the development of six important dollar-earning crops of South India, viz. pepper, cardamom, ginger, turmeric, cashewnut and lemon-grass was very inadequate. The Ministry of Food and Agriculture, accordingly, constituted a high level committee to obtain basic information needed for a study of the situation with a view to considering what specific measures are necessary for developing the production and marketing of these six agricultural products.

Members and Terms of Reference

The personnel and terms of reference of the Spices Enquiry Committee were announced in the letter No. F. 63(4)/51-A dated the 23rd October, 1951 of the Indian Council of Agricultural Research, New Delhi. The following were appointed as members of the committee:—

1. Shri K. R. Damle. I. C. S., Secretary to the Government of India, Ministry of Food & Agriculture, and former Vice-President of the Indian Council of Agricultural Research, New Delhi—*Chairman.*
2. Shri A. K. Menon, former M. P.—*Member*
3. Shri N. Alexander, former M. P.—*Member*
4. Dr. B. N. Uppal, Agricultural Commissioner with the Government of India, I. C. A. R., New Delhi—*Member*
5. Dr. M. B. Ghatge, Agricultural Marketing Adviser to the Government of India, New Delhi—*Member*
6. Dr. T. G. Shirname, former Agricultural Marketing Adviser to the Government. of India and present Director of Agriculture, Bombay State—*Member*
7. Shri C. M. John, Director of Research, Central Coconut Research Station, Kasaragode—*Member*
8. Shri J. V. A. Nehemiah, Secretary, Indian Council of Agricultural Research, New Delhi—*Member-Secretary*
9. Shri M. B. Nayar, B. Sc. (Agri.), M. Sc., *Officer on Special Duty*

Shri A. K. Yegna Narayan Aiyer, Retired Director of Agriculture, Mysore, who was also appointed as a member could not accept that office for health reasons but has given his suggestions in writing to the committee.

The terms of reference of the committee were "to examine the whole position regarding the production and marketing of six agricultural commodities, viz. pepper, cardamom, ginger, turmeric, cashewnut and lemon-grass oil and make recommendations as to how the production and marketing of these commodities could be improved". The committee was also asked to see whether centralised direction was necessary and feasible and, if so, in what form to bring about the desired improvements.

Questionnaire

A draft questionnaire was drawn up and was approved in a special meeting. It is reproduced in Appendix I. According to the terms of reference, the questionnaire was classified into 10 major heads, viz. production, cultural practices, irrigation, marketing, grading and standardisation, export, transport and storage, finance, cooperative marketing and miscellaneous. The questionnaire was circulated to the State Governments concerned, Directors of Agriculture, growers, traders and other interested individuals. Replies to the questionnaire were invited by the 30th November, 1951, but this date was subsequently extended to 31 December, 1951. In all 2,338 copies of the questionnaire were sent out and 86 replies were received, of which 17 replies were from officials and the remaining 69 from non-officials. The answers to the questionnaire were very varied and in many cases vague. The Officer on Special Duty, hence, prepared a digest of the replies and collected a lot of supplementary information and circulated the same to the members from time to time.

Meetings

The committee held several meetings during the period of its working to consider the various replies and suggestions made.

Study Tours

Some of the members of the committee and the chairman undertook study tours in important areas, *vide* page ix, where the agricultural commodities specified are grown with a view

to obtaining a closer knowledge of the problem. These tours were instructive and furnished the committee with a good deal of material for their discussion. During these study tours the committee also considered it important to take evidence of leading cultivators, traders, representatives of cooperative societies and government officials of the various tracts, irrespective of whether they had replied to the questionnaire or not, to get a knowledge of the agricultural conditions and problems of the growers of the particular agricultural commodities, and to get their suggestions for effecting improvements. The evidence of over 250 growers and 30 officials was taken.

Acknowledgment

We desire to place on record our considered appreciation of the cooperation rendered, particularly by the Governments of Madras, Mysore, Travancore-Cochin and Coorg during the various enquiries we conducted in those States. We also wish to record our appreciation of the assistance rendered to the committee by the various State officials and the cooperation they gave in bringing round the cultivators, traders and other interested persons to give evidence before the committee. The committee was particularly impressed by the keen interest taken by officials, non-officials and Ministers of the different States and their eagerness to bring about improvements in the production and marketing of the agricultural commodities specified, importance of which to the agricultural economy of the States concerned has not received proper recognition so far.

We thank all those individuals, associations and bodies and cooperative societies who helped us in our task and particularly the growers who gave frank evidence before the committee and brought to our notice their specific problems and difficulties.

We desire also to place on record our high appreciation of the services rendered by the Officer on Special Duty, Mr. M. B. Nayar, who prepared a digest of the replies received to the questionnaire, collected supplementary information, helped the committee members in drawing up their programme of work, made arrangements for their study tours and prepared preliminary draft reports for their consideration. It would not have been possible for the committee to cover such a wide field without his zeal, devotion and hard work.

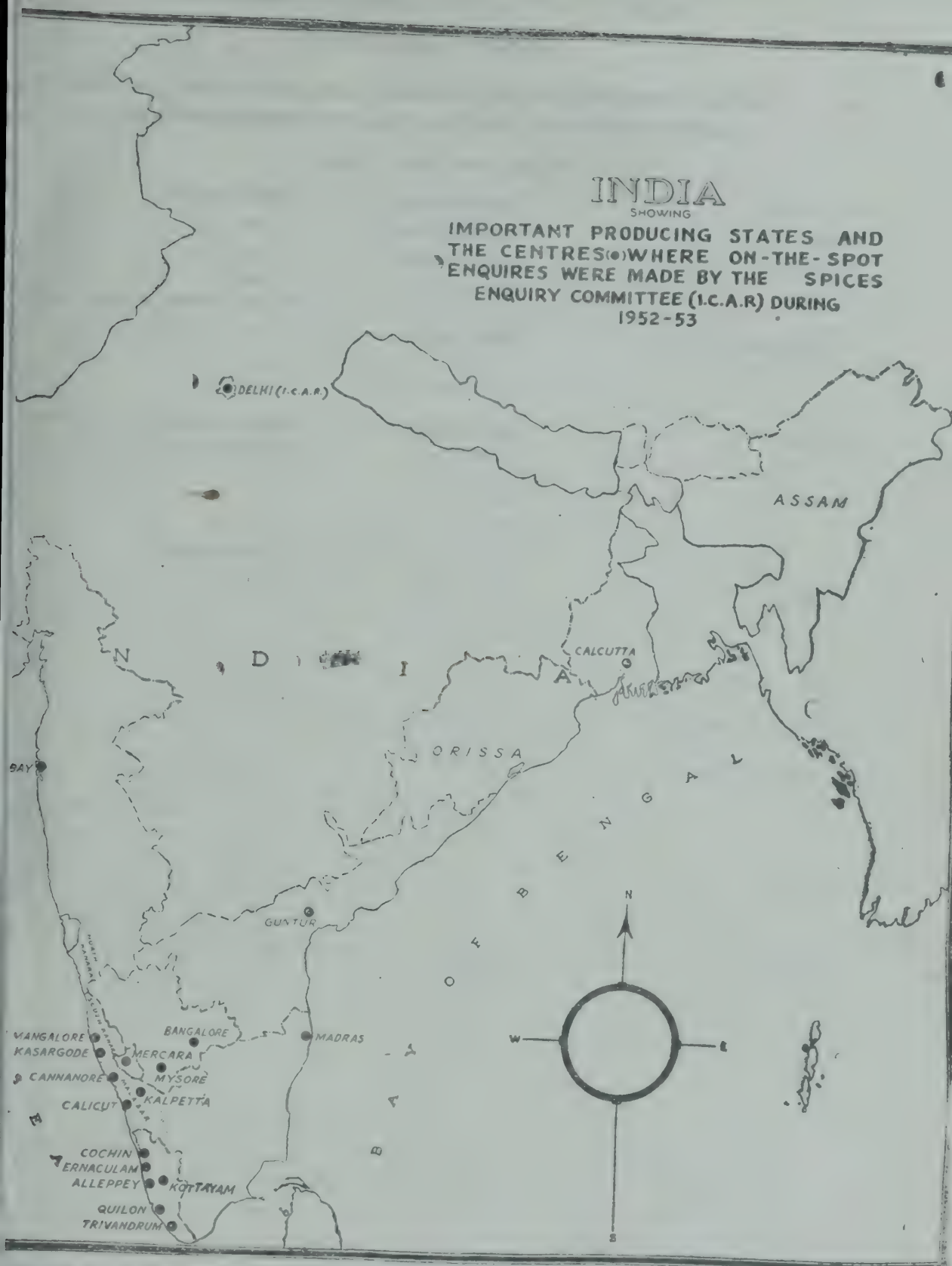
General Observations

We observed a general sense of awareness on the part of the growers, officials and non-officials of the importance of the agricultural commodities, particularly to the coastal region. There is a feeling among them that these agricultural products which have assumed importance in the economy of the country, particularly as dollar-earners, have not received proper recognition and that there has not been any organised efforts for improving the production and marketing of these commodities on the lines of the work done in regard to tea, coffee and rubber. The need for better planning, more agricultural research and coordinated efforts in executing developmental measures were pointedly brought to our notice as measures which should substantially increase production and result in financial gains both to the growers as well as to the governments concerned. We feel that the development of these commodities should be considered as an important aspect of agricultural development work in the regions where these agricultural commodities are grown and that urgent measures should be taken in this regard as very little attention had been paid so far to these crops in spite of the fact that the value of exports in 1951-52 from some of these crops was over 23 crores of rupees.

In making its recommendation the committee has been particularly careful to avoid suggestions which cannot be implemented by the government easily. While the committee has made an extensive study of the subject and has given exhaustive factual information to enable the government to formulate developmental policies, its recommendations have been limited to those which could be implemented without undue difficulty during the next 5 to 10 years.

(Signed) 1. K. R. Damle, *Chairman*
2. A. K. Menon, *Member*
3. N. Alexander, ,,
4. B. N. Uppal, ,,
5. M. B. Ghatge, ,,
6. T. G. Shirname, ,,
7. C. M. John, ,,
8. J. V. A. Nehemiah, *Member-Secretary*
9. M. Balakrishnan Nayar, *Officer on Special Duty*

New Delhi;
dated the 15th October, 1953



f India showing important spice-producing areas and centres where on the spot enquiries were
es Enquiry Committee

TOUR ITINERARY

List of important centres visited in the producing areas and the dates on which enquiries were made by the Spices Enquiry Committee during 1952-53

	I. *Travancore-Cochin State*	
Ernakulam	April 29, 1952	Public enquiry
Alleppey	April 30, 1952	Do.
Kottayam	April 30, 1952	Do.
Quilon	May 1, 1952	Do. (visited Project area *en rou*
Trivandrum	May 2, 1952	Do.
	II. *Coorg State*	
Mercara	December 18 a1 19, 1952	Public enquiry and vi cardamom plantation
	III. *Mysore State*	
Mysore	December 20, 1952	Public enquiry
Bangalore	December 21, 1952	Do.
	IV. *Madras State*	
Madras	January 16, 1953	Public enquiry at Ft. St. George
Calicut (Kozhikode)	January 17 and 18, 1953	Public enquiry
Kalpetta (Wynad)	January 19, 1953	Public enquiry and dvi plantations
Calicut	January 20, 1953	Visit to M/S Pierce Lesli Co's cashewnut proc factory
Cannanore	January 22, 1953	Public enquiry and vis Madras pepper re stations
Kasargode	January 23, 1953	Public enquiry
Mangalore	January 24, 1953	Public enquiry

CHAPTER I

PEPPER (*KALI MIRICH*)

1. General outlook

Black pepper, which has become an important article of international commerce, is produced chiefly in India and Indonesia. Borneo, Siam, Sarawak, Indo-China, and Ceylon and more recently Brazil are other important sources of commercial pepper, but the annual supply from these sources is comparatively small.

The world's present pepper crop and the share of different countries have been estimated and are given in Table I.

Table I

Estimated pepper crop in different countries of the world

Countries	Pre-war (1938-39) (tons)	Post-war (1951-52) (tons)	Increase (+) or decrease (—) over pre-war	
			tons	per cent
India	18,500	21,500	+3,000	+16
Indonesia	62,000	10,000	—52,000	—84
Borneo, etc.	4,000	2,000	—2,000	—50
Indo-China	4,000	2,000	—2,000	—50
Sarawak	4,000	5,000	+1,000	+25
Others	1,000	3,000	+2,000	+300
Total	93,500	43,500	—50,000	—53

The above figures show that the world supplies of pepper have declined considerably during the post-war period. As compared with 93,500 tons produced before world war II, the present supply of this spice is reckoned at only 43,500 tons showing a total fall in world supplies to the extent of 50,000 tons or 53 per cent. These figures also clearly show that this steep fall is solely due to the loss of the Indonesian crop. Except a slight increase noticed in India and Sarawak and a few other countries such as Brazil and Ceylon, there has been a general curtailment of production in all the other major producing countries.

During the war, there was large-scale destruction of the pepper plantations in Indonesia as a result of which the supply from that

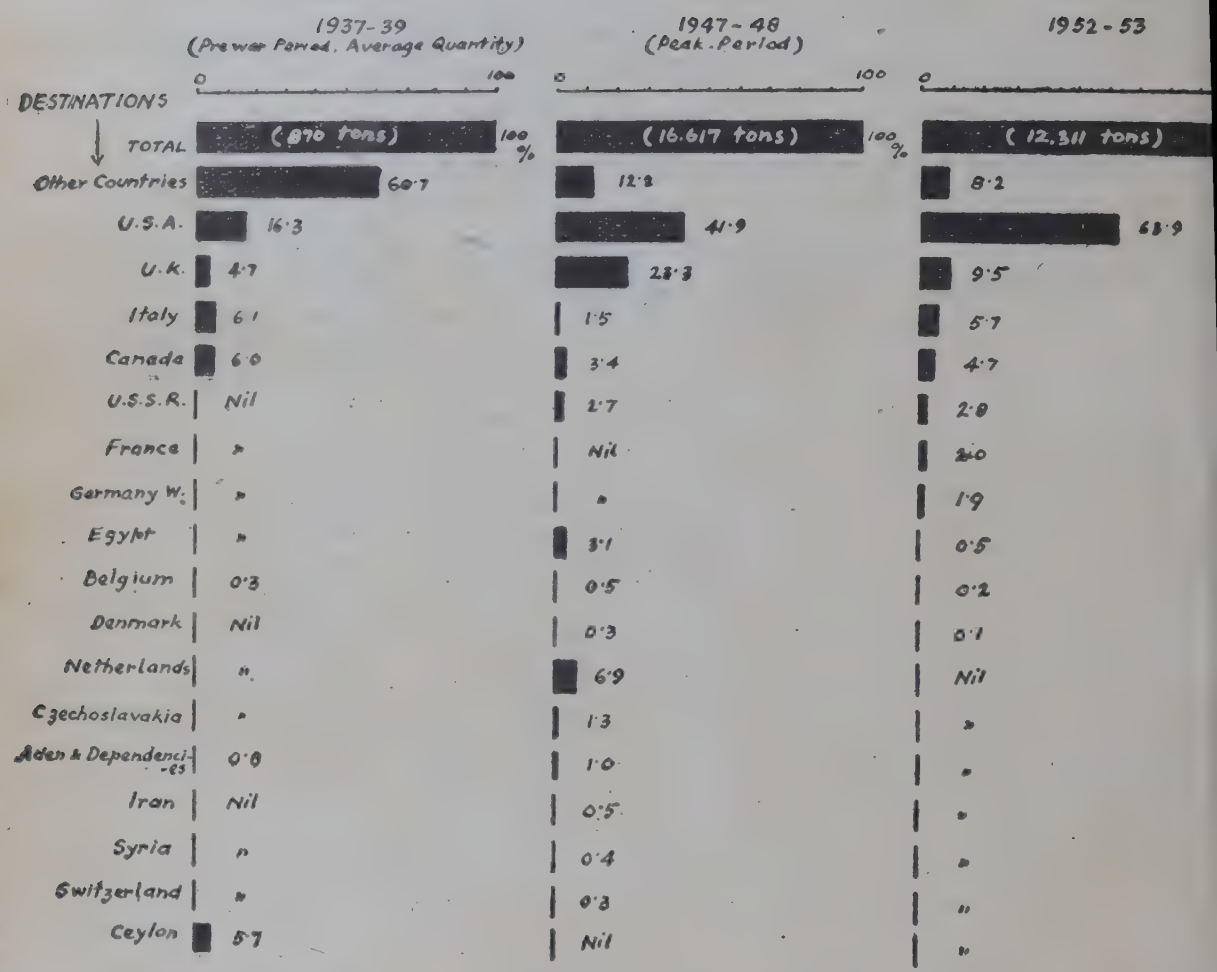


Fig. 3. Percentage export of pepper from India to different countries of the world

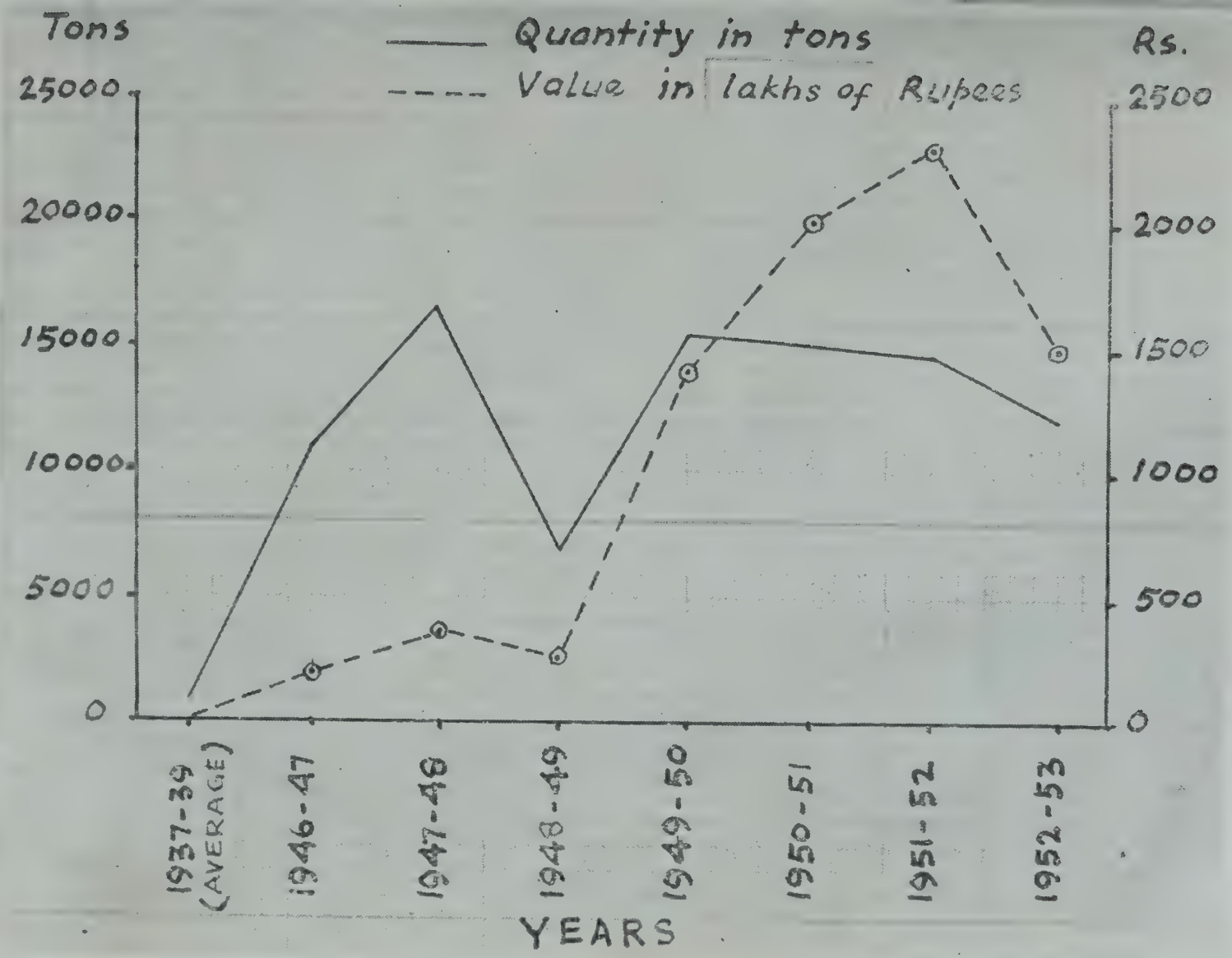


Fig. 4. The trend of export of pepper from India

ource declined from 62,000 tons to a meagre 10,000 tons, showing reduction of 84 per cent. Similarly, the production in Siam, Borneo and Indo-China has also fallen and has resulted in a total reduction of the pepper crop in these regions by nearly 75 per cent from 74,000 ons to 19,000 tons. Although vigorous attempts are being made by these countries to replant their gardens and to rehabilitate their pepper industry, the progress is reported to be slow on account of many practical difficulties and the supply position in these countries s not expected to improve for some more years. It is against this background of continued post-war shortage of world supplies that we should view the problems of the pepper industry in India and frame plans for its development.

Due to the general shortage of supplies, the world trade in pepper has also declined during the post-war period. On an average, the net pre-war annual exports of pepper from principal sources amounted to 60,000 tons (*vide* appendix IV). As compared to this, the quantity of this spice entering international trade at present is estimated to vary from 22,000 tons to 25,000 tons. Before world war II exports took place mainly from Indonesia and other countries of South-East Asia and India's share in the international trade in this spice was insignificant. Since the commencement of the war, the demand for India's black pepper has steadily grown, particularly in the U.S.A. and Europe and bulk of the world's present requirement of this spice is being met by exports from this country. As against less than 1,000 tons exported before the war, the exports of pepper at present from India to the overseas markets have increased to nearly 15,000 tons.

The present shortage of world supplies has been solely responsible for focussing world's attention on India's pepper crop, but the Indian industry should utilise this opportunity to gain the confidence of its foreign customers and try to retain the present position in the world markets by giving satisfaction to them in respect of both the quality and price of this product.

2. Position of the industry in India

i) *Some facts regarding cultivation*

The pepper plant, *Piper nigrum*, L. is indigenous to the forests of Travancore and Malabar and has been cultivated in India from time mmemorial. The large-scale cultivation of the crop is largely confined to the sub-montane tracts in and below the western ghats of Penninsular India and covers the State of Travancore-Cochin and Malabar and South Kanara districts of Madras. To a smaller extent, the crop is grown in parts of Mysore, Coorg and Bombay. The crop is met with also in Assam in Sylhet and Khasi Hills but its cultivation in these regions is not at present of any commercial importance. Generally speaking, the pepper belt of India consists of the Malabar coast extending from Konkan (North Kanara) in the north to Travancore-Cochin in the south.

The pepper plant is grown on living trees or other supports known as 'standards'. It is a perennial shrub which lasts in the plantations for 25 to 30 years, although in some of the well-maintained gardens, the life of the vines has been found to be over 60

years. It grows from almost sea level up to an altitude of 3,500 above the mean sea level but the coastal sandy regions are not fo very suitable for the successful cultivation of this crop. The s found most suitable for the crop are the clay loams but it is wid grown on red loams and sandy loams overlying the lateritic hill t of the western ghats. As compared to the soils of the East Ind which consist of fertile and volcanic rock debris, the soils of pepper tracts in India are poor and depleted and yield po er crops. It is an unirrigated crop which is raised solely with help of the monsoon rains. Being a tropical plant, the crop thri best in humid and moist climate and in regions where the avera annual rainfall is well over 80 inches (*vide* Appendix III). Pla having an average rainfall of less than 50 inches are not consider suitable for the cultivation of pepper. The crop tolerates a minimu temperature of 50°F. and a maximum of 104°F. The propagation the crop is done vegetatively by means of cuttings.

As already stated, the pepper vine is a woody climber and quires some support for growing. The supports or 'standards' us for the purpose in Indonesia, Borneo and other countries of Sout East Asia consist of dead-wood posts, but in India, invariably livi trees are preferred. Any of the existing jungle trees are used f the purpose or sometimes seedlings of the local *murukku* tree (*Er thrina indica*) are specially planted at a regular distance of about feet and the pepper vines are planted at the base of these 'standard The vine grows quickly on this 'standard' and covers it with its da green foliage and forms into the shape of a bush around the 'standar Though the pepper vine grows to a height of 30 feet and more d pending upon the growth of the 'standard', each bush is not allowe to grow beyond 20 feet in order to facilitate the picking of the pepp spikes when mature.

The vines begin to flower from the middle of July, and dependin upon the varieties planted, the berries become ripe for harvest fro January to March. When ripe, the berries assume a beautiful orang or cherry colour. The fruits, which are small berries carried o slender spikes, begin to appear from the third year after plantin The out-turn of the crop is poor at the first harvest and goes on i creasing up to the sixth year; from the seventh year onward full yield can be expected from the plantations.

The preparation of commercial black pepper from the harveste berries is simple. The whole spikes with the berries, are spread o a mat or clean floor and rubbed between the hands or trampled unde feet in order to separate the berries. These are then dried in th sun for 5 or 6 days. When fully dry the outer skin becomes blac in colour and shrunken in size and assumes the characteristic wrinkl ed appearance of the black pepper of commerce. The Indian suppl consists mostly of this quality of pepper.

In Indonesia and other countries of South-East Asia, white peppe is also prepared for commercial purposes. Both white and blac peppers are derived from the berries of the same pepper plant, *Pipe nigrum*, L. The only difference is that in preparing white pepper the outer black skin has been removed from the berries by soakin them in water immediately after harvest and trampling them unde feet later in order to remove the outer skin. The supply of whit pepper in India is very small and is not of any commercial import ance.

There are roughly three systems of pepper cultivation practised n India. The first system consists of clearance of jungle lands and arge-scale cultivation of pepper in the sub-montane tracts and lower ltitudes. This system is prevalent in Travancore-Cochin, Malabar nd South Kanara. While clearing jungles for pepper cultivation he existing trees are left undisturbed in Travancore-Cochin to be sed as 'standards' for growing the pepper vines and separate standards' are not, therefore, provided. On the other hand in Mala-ar and South Kanara, before starting the pepper plantation, the ntire hill slopes are cleared of all vegetation and separate 'standards' f the local *murukku* tree (*Erythrina indica*) are planted at nearly 0 feet apart. The cuttings of pepper vines at the rate of 5 to 10 uttings per 'standard' are then planted in small pits on the northern nd eastern side and a little away from these 'standards'. The outhern aspects are always avoided as the after-noon sun in the ummer months may kill the vines outright or cause sun-burn. Nearly half the length of cutting is planted inside the pit and the oil around the planted cutting is pressed hard and heaped up to pre-ent rain water from getting in and causing water-logging. The free nds of the pepper cuttings above the ground are then pressed close o the 'standard' and tied together with a rope. The tying of the rowing vines on the 'standard' is then attended to periodically to eep pace with the growth of the vines. Although 5 to 10 cuttings re planted at the base of each 'standard', more than half of these do ot survive and only 2 to 4 vines generally grow around each 'stand-rd'. The vines respond very well to manuring. Applications of owdered bean-cake, fish guano, dried prawn refuse and burnt top-oil have been attended with good crop yields in the countries of outh-East Asia. But in India manure is not generally applied to the epper gardens particularly in big plantations and except one or two eedings and hoeings given around the base of the pepper bushes, ery little after-care or cultivation is bestowed. On an average, here are 300 to 400 'standards' per acre and the yield of commercial ack pepper has been found to vary from $\frac{1}{4}$ lb. to 2 lb. per 'standard'. ccurate costs of pepper cultivation are not available in any of the oducing areas. But according to some owners, the cost of estab-shing and maintaining a pepper plantation of three acres consisting 1,000 'standards' up to the fifth year works out to Rs. 3,000 at the esent rates of wages. The initial costs of clearing the jungle and eparatory cultivation are very heavy and according to the same urce nearly half of this expenditure is incurred on these items, uring the first year itself when starting the new plantation.

The second system of pepper cultivation consists of growing mix-d crops in the house-compounds and outlying areas at the foot hills nd coastal regions. Under this system, pepper vines are grown only n existing trees such as jack, mango or even coconut and arecanut own in the gardens. The number of pepper vines owned by the dividual cultivators under this system is small and these are gen-ally well-cared for, and as a result some of these vines have been und to live for more than 60 years, although the normal life of a ge-scale pepper plantation is estimated at only 25-30 years. hough only a smaller proportion of the pepper crop is grown under is system it is this group which offers immediate scope for inten-ve cultivation and development.

The third system of pepper cultivation is as an inter or subsid crop along with other plantation crops like coffee, cardamom orange and is practised to a small extent in parts of Coorg Mysore. The owners in these cases are big planters and are directly interested in pepper cultivation. This subsidiary cultiva has become popular only in recent years and planters in these a are not quite sure whether such inter-cropping would adver affect the yield of their main crop.

(ii) *Differences in crop estimates*

Until recently pepper was grouped under spices and condim and no separate statistics of its area and production were recor in the agricultural returns. Since 1948-49, the importance of crop has been fully recognised and the Directorate of Economics Statistics began to publish regular crop forecasts of the pepper India.

According to these published crop forecasts, the area under pep in India during 1951-52 was 1,92,231 acres out of which 1,02,500 ac were distributed to the Madras State in the two districts of Mala and South Kanara while the State of Travancore-Cochin accoun for 85,768 acres. The other pepper producing areas, viz. Bomb Coorg and Mysore, together accounted for only 3,963 acres.

Although these official figures indicated a reduction in acreage compared to those of 1948-49, new pepper vines have been plant everywhere, in many of the house-compounds and outlying areas Travancore-Cochin, Malabar and South Kanara and that the increa in acreage thereby could be reckoned at 5 to 10 per cent in rece years. On a rough calculation, there are at present 75 million pepp 'standards' in India of which 70 million represent old pepper bush and the remaining represent new vines planted during the post-w period.

The production of black pepper according to official foreca published for 1951-52 amounted to 27,916 tons from 1,92,231 acr Various trade representatives who gave evidence stated that the official figures were grossly over-estimated and that their estimate the pepper crop in India for the same period was very much less, n exceeding 19,000 tons. In their view such discrepancies were not ne and existed for the past several years as indicated in Table II.

TABLE II

Discrepancies in the estimates of pepper production in India

Year	Estimated official production (tons)	Trade estimate (tons)	Difference (tons)
1948–49	30,619	22,000	+ 8,619
1949–50	31,165	20,000	+11,165
1950–51	30,570	18,000	+12,570
1951–52	27,916	19,000	+8,916

It will be seen that the official estimates of production varied from those of the trade by as much as 12,570 tons in certain years. On examination it was found that this discrepancy was largely due to the exaggerated crop estimates from Travancore-Cochin, which is the most important among the reporting States, included in the official crop forecasts (*vide* Appendix V). In the pre-war days, when India exported only small quantities of pepper to the world markets, such discrepancies in crop estimates were not of much consequence. At present, however, bulk of the Indian crop is exported and international price quotations are bound to be greatly influenced by the crop estimates emanating from official sources. We, therefore, consider that steps should be taken to reconcile such wide discrepancies and to examine the basis of crop reporting in all the producing areas, particularly in Travancore-Cochin. A more rational basis for the determination of area and normal yield should also be evolved by conducting pilot statistical surveys.

(iii) *Total production*

In view of the differences in crop estimates pointed out to us, we have estimated the production figures for 1951-52 on the basis of the evidence collected by us. According to these estimates, the total production of black pepper in the different States of India during 1951-52, has been as follows:

Travancore-Cochin	12,00 tons
Madras (Malabar and South Kanara)	9,000 ,,
Bombay (North Kanara)	150 ,,
Coorg	150 ,,
Mysore and other States	negligible
	21,300 tons

It will be clear that pepper production in India is concentrated in the two southern States of Travancore-Cochin and Madras which together account for 98 per cent of the pepper crop in 1951-52. Travancore-Cochin is the major producing area and accounts for 56 per cent of the total crop. In this State, the most important sources of supply are the *talukas* of Thodupuzha, Muvattupuzha, Vaikam, Chenganacherry and Meenachil (Palai). Madras State ranks second in importance and accounts for 42 per cent of the pepper production in India. In Madras, pepper production is confined to the northern *talukas* of the Malabar district and the Hosdurg *taluka* of the South Kanara district. In both these States, production is carried on in small holdings and nearly 60 per cent of the cultivated holdings have been estimated to be under one acre in size.

Pepper is produced also in Sirsi, Coorg and parts of the Malnad area of Mysore State but the annual output from these sources is relatively small, and accounts for hardly two per cent of the total Indian crop.

In the absence of reliable crop estimates for the previous years, the trend of pepper production could not be ascertained. But on the basis of pre-war crop of 18,000 tons, the present pepper production in India shows an increase of 3,300 tons or 17.8 per cent. The present

enhanced production is attributed not so much to the extension pepper cultivation to new areas as to the intensive methods of cu vation and better attention paid by the garden owners. In 1952- 85 to 90 per cent of the normal crop amounting to 20,700 tons only expected showing a decline of nearly 600 tons as compared to t figures of the previous year.

It is clear that the Indian production has not kept pace wi the increase in the world demand for the produce during the po war period. Internal production should therefore be stepped up a greater attention should be paid towards intensifying agricultu practices in the existing gardens than in opening up new plantatio The details of a co-ordinated Ten-Year Plan for intensive develo ment of the pepper crop in India should be worked out by the Ce tral Government and put through expeditiously. In preparing th plan, the object sought to be achieved is that India should be in position to export almost the entire present annual output to me the demands of the foreign markets and that the internal requir ments of this product should be met out of the increased producti resulting from the proposed Ten-Year Pepper Development Plan. A the present pepper gardens consist of many old and uneconom pepper bushes, a systematic attempt should first be made to repla these by improved varieties in all the pepper tracts. Arrangeme should be made to complete such replacements in the course of th next five years so that at the end of 10 years, all the pepper garde will consist of only the bearing vines of the improved types. Speci nurseries will have to be raised for the purpose and other technic and financial facilities will have also to be provided for carrying ou the intensive cultivation and adopting control measures against pes and diseases.

There are many local varieties (*vide* appendix VI) and mos of the gardens consist of a mixture of many varieties. The yield o the pepper gardens varies widely in the different producing area depending upon the soil, fertility, cultural practices, nature of vari ties grown and the age of the pepper bushes. On account of all thes factors the average yield of pepper crop is found to vary from 100 l to 300 lb. per acre. The poorest yield is reported from the Malna areas of Mysore where the average yield of commercial black peppe does not exceed 100 lb. per acre. Almost the same yield is obtaine in the Sirsi area of North Kanara where it amounts to 112 lb. I Malabar and South Kanara, the average yield of the pepper garde is estimated to be 250 to 300 lb. per acre. The maximum average yiel noticed in Travancore-Cochin amounts to 350 lb. per acre. Th average yield of all these areas works out to slightly more tha 2 cwt. per acre, whereas under improved practices the out-turn of a these gardens could be considerably increased.

(iv) *Foreign imports*

Very little black pepper has been imported into India from foreig countries in recent years. The imports during 1951-52, amounted hardly 118 tons and consisted mostly of cheaper Indonesian pepper r exported from the Straits Settlements. Other sources of imports a Burma, Java, Kenya Colony, Hong Kong and some of the Briti possessions. Bulk of the imports however, consisted of re-expor from the Straits Settlements and was received through the We

engal ports. The total supply of black pepper in India consisting of e indigenous production plus imports thus wroks out to 21,418 tons ring 1951-52.

) *Foreign exports*

India has always been a net exporter of black pepper to the foreign untries. The quantities and values of black pepper exported from dia since 1937-38 are given in Table III.

TABLE III

uantity and value of pepper exports from India during 1938-39 *to* 1951-52

Year	Quantity (tons)	Value (in lakh rupees)
1937–39	870	3·7
1946–47	11,001	206·5
1947–48	16,617	372·1
1948–49	7,052	267·1
1949–50	15,631	1450·5
1950–51	15,394	2040·3
1951–52	14,873	2317·1
1952–53	12,311	1596·0

As compared with nearly 900 tons exported before the war, the esent exports of black pepper from India have increased to nearly .000 tons. From hardly two per cent before the world war II, dia's share of the world pepper trade increased to more than 70 er cent during the post-war period. Owing to the unprecedented crease in pepper exports, there has been a steep rise in pepper ices in India and the value of the exports, therefore, increased nsiderably during the post-war period. While in 1938-39 the total alue of pepper exports from India was only Rs. 3·4 lakhs, it increased to Rs. 206·5 lakhs in 1946-47, and amounted to as much as s. 2317·1 lakhs during 1951-52. The fall in exports noticed in 1952-3 was mainly due to speculative buying in the U.S.A.

The exports of black pepper to the foreign markets take place ainly through Cochin. Nearly 10,000 tons were shipped from this ort alone during 1951-52. After the development of the port at ochin, the importance of other west coast ports such as Alleppey, alicut, and Mangalore has declined.

During the war, considerable quantities of pepper were exported om the Bombay ports. These were mostly re-exports of the pro-uce obtained from Malabar and Travancore-Cochin.

The main market for Indian pepper is the United States America. Nearly 30 per cent of India's pre-war exports went to country. Immediately after the war, the total exports from India creased greatly from 873 tons to 11,002 tons. As much as 38·1 cent of this enhanced shipments also went to the U.S.A. In 1950 the total exports increased still further to 15,394 tons and the shar the exports to America amounted to 69·7 per cent. During the war years America used to import nearly 24,000 tons of pepper mo from Indonesia. At the present time, the American demand is e mated to be of the order of 14,000 tons out of which 56·3 per cen at present met by the Indian supplies. Though bulk of Ind present exports go to the U.S.A., there is further scope for expand that market and increase the dollar-earnings of this country.

The main destinations and the share of different countries in pepper exports from India are given in appendix VII.

Although India exported pepper regularly to the U.S.A. a Canada during the post-war period, there has been occasional off-t of this Indian product from other hard currency areas also such Mexico, Cuba, Columbia, Bolivia, Guatemala, Haiti, Ecuador, H duras, Panama, and Salvador. The imports into these countries relatively small and sporadic but the scope for export promotion these areas should be examined by the Indian Government Tra Representatives concerned.

Among the other markets for Indian pepper, the U.K., Italy, t U.S.S.R., Egypt, Aden and dependencies are the most importa While other producing countries have special organisation in t U.S.A. and other consuming countries for promoting exports of the countries' products, the Indian trade appears to be handicapped grea ly by lack of arrangements for propaganda and publicity even important markets. All sections of the Industry who gave eviden impressed upon us this lacuna in our foreign trade and pointed o that the Indian Government Trade Representatives alone could not this job. Their hands are too full with other products to devote u divided attention to spices. Unless separate agencies are set up at th destinations as is done by other producing countries and as in the ca of other commercial crops, wholetime attention will not be given a our export trade is bound to suffer. Besides foreign publicity a sales promotion, these agencies should closely follow the consum requirements and competition from other countries and undertake supply regular information regarding prices, quality, etc. to the hon market. In order to facilitate exports and sales promotion, a doc mentary film should also be prepared of the various processes of th industry and exhibited not only in the foreign markets but also the non-producing areas of Upper India.

Generally, the exports to foreign countries are only of one qua lity known as the 'garbled' pepper. 'Garbled' pepper is clean and dr and is generally free from dust, dirt, etc. The proportion of ligh and hollow berries is also the minimum in these samples. Th exports to the U.S.A. and other foreign markets are only of th 'garbled' quality. There are not many complaints as regards th quality of pepper exported from India nor has there been any increas in the claims preferred by the foreign buyers on the basis of quality The quality of the pepper exports from India is, therefore, considere satisfactory.

We would, however, take this opportunity to mention some of the alpractices of the trade which have come to our notice. Old lots pepper and rejections after garbling are of inferior quality and ve a dull appearance. In order to give the berries the shining ack appearance of natural pepper this stuff is smeared with a coat- g of white oil. Besides improving the appearance smearing with is heavy mineral oil also increases the weight of the sample which also taken advantage of by the sellers. Oil-washing is, however, jectionable from the point of view of public health and certain untries like the U.S.A have statutorily prohibited the import of ch products. We are also told that small fruits of many jungle shrubs d trees particularly of *Lantana*, and *Vitex altessiona* which semble the pepper berries are specially gathered and dried and lulterated with the pepper berries. These practices damage the ospects of establishing firm trade relationship with the foreign untries and should be discouraged. More recently, in the middle 1952 the Indian shippers suffered heavy losses on account of the tention of many consignments in the U.S.A. on account of insect festation. These had to be cleaned and reconditioned at the ship- rs' cost before admission into the U.S.A. Steps should be taken avoid such losses in future by conducting our foreign trade on the asis of standard qualities. What is required at the moment is to andardise the quality of our pepper exports and win the confidence our customers by supplying them with specified standards.

Many foreign buyers demand certificates of origin, quality and eight as regards consignments of pepper shipped from India. everal trade associations have therefore made arrangements on their vn to conduct "chamber survey" and issue the required certificates regard to these quality factors of pepper and other spices. In rder to avoid confusion in these standards it would be better if defi- ite grades and grade specifications are framed on an all-India basis nder Agricultural Produce (Grading Marketing) Act and these ecifications are adopted by the trade and included in their trade ntract terms.

For export purposes, pepper is generally packed in double gunny gs, with a capacity varying from $1\frac{1}{4}$ cwt. to $1\frac{1}{2}$ cwt. While the ter bag is new, the inside one is often old. Although the present ethods of packing appear to meet with general approval of the ade, we would recommend that new gunny bags should be used en for inside packing in order to prevent any possible contamina- on. Along with framing of standard qualities for pepper, the pack- g should also be standardised for export purposes.

Most of the export trade from India is at present carried on ac- ording to the contract terms prescribed by the American Spice Trade Association of New York (*vide* Appendix VIII) or the General Pro- luce Broker's Association of London (*vide* Appendix IX). In both hese contracts, there is no provision for mutual allowances for quality r for arbitration facilities in India in the case of disputes between the arties. The arbitration facilities are provided either in New York r London and the Indian shippers are generally not in a position to vail of the same. Steps should, therefore, be taken to prepare ndian Standard Contract terms for pepper as well as for all other pices and to persuade the importance to agree to provide arbitration

facilities in India and to be governed by our proposed standard quality and packing which will be specified in the Indian Trade C tract Terms.

(vi) *Dollar-earnings from export*

The total value of the pepper exports from India and the amo of dollar-earnings during the four years ending 1952-53 may be s from Table IV.

TABLE IV

Dollar-earnings from the exports of black pepper (in lakh rupees)

Year	Total value of exports	Amount earned in dollars	Percentage
1949–50	14,50·5	814·7	56·1
1950–51	20 40·3	1509·0	73·9
1951–52	23,17·1	1301·8	56·1
1952–53	15,95·7	1127·0	70·6
Average	18,50·9	1188·1	64·2

The value of the total exports has varied from Rs. 14·5 crore to Rs. 23·17 crores during the last four years, the average value o annual exports being Rs. 18·5 crores. Out of this income from ex ports, Rs. 11·88 crores representing 64·2 per cent were earned in hard currency.

Since November 1949, the Government of India has levied an ex port duty on pepper at the rate of 30 per cent *ad valorem* with a maximum of Rs. 150 per cwt. Although this duty was levied in order to minimise the effects of speculative activities and to serve as an anti-inflationary measure, the Central Government have already received a revenue of Rs. 12·94 crores as duty alone during the four years ending 1952-53. Roughly Rs. 7·34 crores of this duty were received from the exports from Travancore-Cochin and the remaining Rs. 5·6 crores from the Malabar crop including that of South Kanara and Coorg.

None of the witnesses who appeared before us complained about the high rate of duty or of its incidence but they have unanimously represented that the Central Government should take early steps to develop this industry particularly in view of the large revenue received from this article alone. We are convinced that very little organised effort has been made either by the respective State Governments or by the Central Government to develop this industry on modern lines. The State Governments concerned are too involved in their 'grow more food' programmes and their representatives have informed us that they cannot afford to divert any funds for the development of the pepper industry. The Central Government should therefore provide for all assistance both financial and technical for developing this industry which affects the prosperity of millions of peasants in these producing areas. Considering the present world

ıortage in this spice, the potentialities of expanding our foreign ade in this product and thereby improving the revenues of the State e also great. Details of a Ten-Year Plan for the development of epper should be worked out and put through expeditiously, with ıe three-fold object of stepping up production, reducing costs of roduction and expansion of internal and foreign markets.

(vii) *Internal demand*

Since world war II and especially after the partition of India, the uantities of black pepper distributed in internal trade have gone own considerably. As compared to a pre-war demand of 9,000 to),000 tons, the quantity of black pepper distributed in various parts f India at the present time (1951-52) is estimated to be nearly 5,000 ons. The estimated quantities can be seen in Table V.

TABLE V

stimated utilisation of black pepper in different States during 1951-52

States	Pre-war utilisation (tons)	Post-war utilisation (tons)
adras	1640	800
ysore	200	100
ombay	320	600
adhya Pradesh	150	100
elhi and Punjab	335	800
ttar Pradesh	800	600
engal	3430	1000
am	600	300
issa	150.	100
ners	1380	600
Total	9000	5000

The quantities distributed in internal trade have been reduced by early half during the post-war period. The quantity of pepper disibuted in the internal markets has also become very poor. It consts of a large proportion of hollow and light berries and a considerble amount of foreign matter. In spite of high prices, good quality epper is unobtainable in the Indian markets. The various trade ssociations in India, should take note of this situation and try to nsure reasonable satisfaction as regards the quality of the produce stributed in the internal markets. The main sources of supply in l the internal markets continue to be the west coast districts of alabar and Travancore-Cochin.

For internal trade the produce is moved mostly by means of coast-steamers and bulk of the produce is transferred from Alleppy and ochin. Formerly, half the quantity entering internal trade used to

be moved to Bombay and the other half to Calcutta which are two important distributing markets for northern India. In re years, however, Calcutta has become the main distributing centr the northern States while the quantities moved to Bombay are m ly for re-exports to the foreign markets.

Besides coastal steamers, part of the movement of pepper to north Indian markets is done by rail. The rail exports take p from Cochin and Tellicherry and are despatched to Madras, Ba lore, Bombay, Delhi, Kanpur and Calcutta. After receipt at Calc the subsequent distribution is also done on rail. Accurate stati of either the coastal or the rail traffic or of carry-over stocks are however, available.

Considering the general shortage of supplies, we should aim releasing as much as possible of our present crop for meeting demands of the world market and try to step up local produc to the extent of meeting our internal requirements.

(viii) *Prices*

Pepper prices have shown phenomenal rise during the post- period. In no other agricultural commodity has this rise in pr been so marked as in the case of black pepper. It has been obser that the main staple food crops like rice have registered an incre of only $3\frac{1}{2}$ times since the war started which is in parity with general rise in the post-war price level. Copra and coconut have increased by nearly $7\frac{1}{2}$ times. Even other spices of these ar like ginger, cardamom and turmeric have shown a rise of only 5 t times over the pre-war level. In the case of pepper alone the p war rise in prices has been of the order of 36 times in certain ye This rising trend of post-war prices may be clearly noticed both internal and world-markets as shown in Table VI.

TABLE VI

Trend of black pepper prices at Cochin and New York

Year	Cochin		New York	
	Price per candy (6 cwt.) Rs.	Price index	Price per lb. in Cents.	Price inde
1939	108	100·0	3·9	100·0
1946	384	355·5	39·1	1002·5
1947	570	527·7	43·8	1123·0
1948	690	638·8	62·2	1584·8
1949	2286	2116·6	100·0	2564·1
1950	3174	2938·8	189·0	4846·1
1951	4158	3850·0	160·0	4102·5
1952	3942	3650·0	140·0	3589·7

In India, Cochin is the most representative market for black pper while New York, being the largest importing centre, forms e index of world market prices. The phenomenal rise in both these rkets may be clearly seen from the table.

The average annual price of pepper at Cochin amounted to hard- Rs. 108 per candy of 6 cwt. in 1939. It increased to Rs. 384 to- rds the end of the war and by 1948 reached the level of Rs. 690. l 1949, the rise has been gradual but it suddenly shot up to Rs. 2,286 1949 and increased still further in the subsequent years. The erage annual price in 1951-52 stood at Rs. 3,942. The outbreak the Korean war and the increased off-take from the U.S.A. have gely contributed to this boom in Indian pepper prices. During s time considerable speculative activities have also been reported. compared to a price index of 100·0 in 1939, it rose to 355·5 in 1946 d 3650·0 in 1952 representing an increase of nearly 36 times over e pre-war level. In New York also similar rising trend of pepper ces during the post-war period has been noticed. From hardly cents per lb. in 1939, the prices of pepper rose to 140 cents in 52 representing an increase of nearly 35 times (*vide* Appendices X and XII).

In both India and the world, the maximum price levels were ched during 1951 and since then there has been a slight recession the prices but considering the present world shortage of pepper d the slow progress of rehabilitation in other countries it is not ely that this recession in prices will continue very much further. yway this is a commodity in which much speculative trading takes ce and should therefore be constantly watched by the Forward rkets Commission for purposes of regulation.

The garbled quality is a much cleaner product and contains light d hollow berries below 3-5 per cent and other foreign matter ow two per cent. The foreign exports are mostly of this quality fetch a higher premium of Rs. 200 per candy (6 cwt.).

The daily export prices of pepper are published in almost all the ortant local papers in the producing areas. But the producers generally unable to derive the full benefit of this price and work k the parity level on account of the differences in the units of e quotation. Correct dissemination of world prices in a manner lligible to the producers is, therefore, necessary.

In spite of this phenomenal rise in pepper prices, the producers do feel enthusiastic to extend pepper cultivation. The main reason hat they do not feel confident that the existing high prices will tinue and do not, therefore, want to take any risk. Moreover, per vines take four to five years to give any satisfactory return l majority of the small producers are not prepared for this period waiting. They need quick returns and, therefore, prefer the culti- ion of root crops or cereals which besides yielding seasonal re- ns also serve as food in these scarcity areas.

There has, therefore, been no appreciable extension of pepper cul- tion in India. This indicates that more than the phenomenal rise rices, what is required is a more stable price level for stepping up rnal production.

(ix) *Assembling and distribution*

The important assembling and distributing markets for p
are in Travancore-Cochin, Malabar, and South Kanara. Whil
duction of pepper is concentrated in the foot-hills of the ghats,
markets are on the coastal towns located within 50 to 100 miles
producing areas. The names of important markets and the qua
of pepper handled at these during 1951-52 are shown in the Tabl

TABLE VII

Estimated arrivals of black pepper in some important marke
during 1951-52

State	Interior market	Assembling & distributing market	Quantity ha (tons)
Travancore-Cochin	Palai	Alleppey	
	Kottayam	,,	
	Thodupuzha	Cochin	
	Muvattupuzha	,,	
	Ponknnam	,,	
Madras			
(i) Malabar	Wynad	Calicut	
		Tellicherry	
	Iritty, etc.	Beliapatam	
(ii) South Kanara	Kanhangad	Mangalore	

The total arrivals in Travancore-Cochin markets during 195
have been estimated at 9,000 tons out of which nearly two-thir
the crop is assembled at Cochin and the remaining one-third
Alleppy. Before the war, Alleppy handled larger quantities
pepper, but after the development of the Cochin port, Cochin
become the main important assembling market for pepper. S
foreign exports also take place from these centres, these mar
serve as both assembling and distributing markets.

The total arrivals in other producing areas consist of 8,000 t
distributed in Calicut, Tellicherry, Beliapatam and Mangalore.
Coorg and Mysore, there are no assembling centres for the crop.
most the entire surplus from Coorg is moved to Tellicherry and
sembled there. Bombay, Sirsi and Siddapur are important cent
but the quantity assembled at these centres is very small. Besi
these arrivals, the retention in villages and the carry-over stocks w
the merchants and by producers are said to be of the order of 2
to 3,000 tons.

As already stated, the interior markets are situated in the fo
hills of the ghats and consist of hilly tracts which do not have pro
roads or even foot-paths connecting the producing area. Impro
ment of road communications in these areas would, therefore, grea
facilitate the marketing of pepper in these areas.

the interior markets situated within a radius of 3 to 10 miles the producing villages, pepper is sold in small lots of 5 to 10 lb. generally carried to the market in head-loads by the producers selves and sold to the village merchants. The village merchant the whole lots on payment of cash. Although no market ges are levied or collected from the producers, deductions for ty, loss of weight and allowances for quality are invariably made ıe village merchants. The units of weight adopted in the village actions are also not uniform. On account of these practices, the ucers in the village markets have not derived the full benefit of post-war rise in pepper prices.

hen the village merchant assembles a sizable quantity of pepper as a candy weighing 6 cwt., he arranges to transport the same e main assembling markets situated in the sea-coast towns. e, the produce is delivered to the commission agents. These nission agents keep the produce in their godowns without charg- ıny godown rent. But they charge a commission ranging from 2 per cent of the value of the produce. There are also custo- deductions on account of what is locally known as *poti palam* h literally means dust in the sample. Whether the sample ains dust or not such deductions are made which invariably ınt to 30 to 40 lb. per candy of produce, representing nearly 5 to cent. of the weight of the sample. In view of this practice the ıtive for selling cleaner samples is lost. The commission agent es payment in part and settles the account after final disposal of produce. Besides commission, other marketing charges payable he seller are for brokerage, weighment and charity. All these ges are deducted before making final payment to the village hants. Before the war, these commission agents stocked consi- ble quantities of pepper in their godowns and used to sell it to shippers as and when there was demand. But during the post- period, many of the big planters have begun to hold back consi- ble quantities of their annual crop and release it only when s are more favourable. Most of these assembling markets are terminal markets for pepper. The shippers and exporters also, te in the same market and they invariably get their supplies these agents. The commission agents arrange to transfer the ıce to the shippers' godowns according to orders. The shippers ge for pepper garbling of the produce in their own godowns and garbling, the produce is packed in double gunnies and exported e foreign markets.

hile these assembling and terminal markets were found to be organised than the primary markets, there are still many ges and deductions which are not sustainable on the nds of the service performed by these agencies and should, efore, be regulated. The unit of weight adopted for sale in both e areas is one candy of 6 cwt. but the candy has been found to from 600 lb. to 700 lb. at different places. It is advisable to ribe one uniform weight for the candy at least in the main West t markets of Travancore-Cochin, Malabar and South Kanara.

countries like the U.S.A., the markets are either owned by ers and businessmen or they combine to form a non-profit pri- corporation to finance and operate the marketing activities by ıs of which the farmers and dealers save time, reduce distribu- costs and derive all the advantages of central direction such as

pooling, grading, publicity, etc. They get expert advice fro various government departments and thus are able to reali benefits of institutional or group marketing as opposed to the m ing by individuals. In India, where nearly 60 per cent of th duction is in small and scattered holdings, it would be advantage our producers to adopt a similar method for the marketing o produce and combine themselves into village co-operatives. stated in certain quarters that such co-operative institutions wou work satisfactorily in the west coast. The working of the T core Co-operative Wholesale Society at Alleppy and the M District Co-operative Produce Sales Society Ltd. do not, hov support this view. Besides pepper, these societies handle othe ducts like ginger, coffee, copra, etc. and have shown steady pr in their volume of business as well as in membership. The difficulties experienced by these societies in the expansion of business were lack of finance and adequate storage facilities. I per godowns are made available in the villages and the Apex be persuaded to give larger financial accommodation to these v societies, the development of co-operative marketing in the ca pepper and all other cash crops would in our opinion make headway in the main pepper tracts. When a large number of village societies are established these could be united into di unions and brought under a State or regional federation. experience and State assistance, such co-operatives could grad develop their business and handle the foreign export trade also order to increase the returns of the small producers and to imp their bargaining power particularly in times of price recession, co-operative agencies can play an important role.

(x) *Uses of pepper*

Pepper is an indispensable item for sauces, soups and curries has been used in this manner in India from very ancient times, p cularly by those whose living standards are higher. It is an imp ant ingredient in many Ayurvedic preparations and is used in form to a small extent. By far the largest quantities imported the United States of America are utilised in the meat packing food canning industries. The grinders in the U.S.A. also pre powder for table use.

3. Research, technology and development

(i) *Need for scientific research*

In spite of the importance of pepper to India, particularly in West Coast districts, very little research work has been done on crop. In Travancore-Cochin, which is the most important produc area for pepper, one pepper farm at Konni was started, but Government closed down the station in 1948 after conducting s piece-meal items of research work. In the Malabar district, Madras Government has been carrying on some research on pepper crop at the Taliparamba Agricultural Research Station some time. But this farm which was originally meant for deal with pepper has now been converted into a multi-purpose resea station and is not exclusively devoted to the research on pepper. cently, however, the State Government has opened one Pepper search Station at Panniyur which is close to the Taliparamba fa

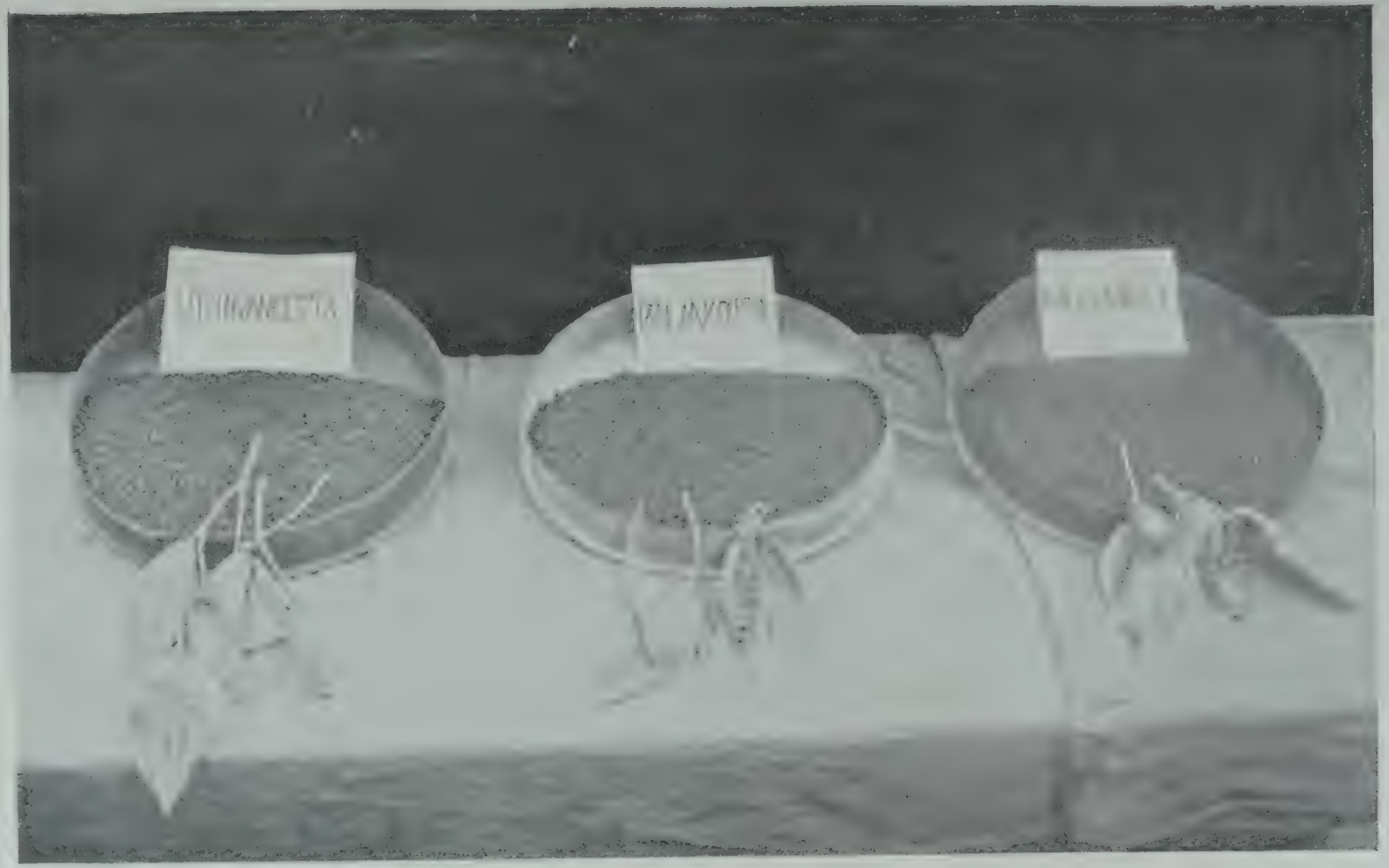


Fig. 7. Three varieties of Malabar pepper. Note the compact nature of spikes in Kalluvalley as compared to the sparsely set grains in others.

is situated only 5 to 6 miles away from it. These farms are not, ever, found to be representative of the larger part of pepper- ring areas of the Malabar district. Although the Indian Council .gricultural Research is already financing a pepper research me in Madras, a revised scheme for co-ordinated research should be prepared in the light of the above observations. In both ancore-Cochin and Malabar, the regional problems awaiting tion are different and almost every witness whom we examined ssed the need for conducting scientific research in these regions mproving the yield and quality of the pepper crop.

Improving planting material

The cultivated varieties of pepper-vine are numerous and each t has its own selection of local varieties. In Malabar and South ara, the most popular varieties are locally known as *Kalluvalli, m cotta* and *Cheriya kodi*. These varieties account for nearly 30, and 20 per cent respectively of the cropped area. In Travan- -Cochin, the most popular variety is known as *Kaniya Kadan* ch occupies 50-60 per cent of the pepper area in the State. Other eties are *Kotta nadan, Karivilanchi, Perimkodi, Kumbha Kodi Chumala*. In Mysore and North Kanara, the varieties are local- nown as *Malligasari, Marata*, and *Doddiga*. Appendix VI shows names of the local varieties and their chief characteristics. Most hese local varieties have been evolved by the cultivators them- es and so far no attempt has been made to breed improved types.

Many witnesses who gave evidence before us complained that one he major difficulties experienced by the cultivators, particularly owners of small gardens, was the lack of an adequate supply of able planting material. Even if sufficient number of cuttings e obtained at high prices, the quality and performance of the vine not assured. In a perennial crop like pepper which lasts in the ntations up to 30 years and more, such risks cannot be undertaken. therefore necessary to take urgent steps to raise a large number pecial pepper nurseries in different producing areas and arrange an adequate supply of reliable planting material. In every pepper en more than one variety of pepper vine are met with and these ist of good and regular yielders as well as poor and irregular lers. Our object should be to replace all the poor and uneconо- vines by means of good and regularly yielding varieties in the se of five years.

As the vines raised from rooted cuttings begin to yield earlier establish better than the ordinary cuttings, the supply should sist mostly of rooted cuttings. These cuttings for the nurseries be selected from high yielding and improved types of vine during months of October-November when these are in the full bearing ge so that the nursery-men can be sure of their performance. This em of raising rooted cuttings is being practised in Malaya and also been tried with success at the Taliparamba Research Station Malabar. Although there are no special difficulties of raising such ed cuttings, yet the number of nurseries will have to be large rder to meet the demands of different producing areas.

When an adequate supply of planting material is available, icularly in the West Coast and arrangements made for replacing per planting week should be organised all over the pepper tract,

all the old and uneconomic vines in each garden and for the pl of such rooted cuttings. This should be carried out on a syste basis at the rate of one-fifth of every garden in a year so tha whole replacement work may be carried out in the course o years. Sufficient inducement should be given to the producers i connection.

In selecting cuttings for planting purposes, particular emp should be placed on one or two economic characters of the plant pepper plant produces both bisexual and unisexual flowers. In to increase the yield, varieties having a large number of bis flowers should be preferred for cultivation purposes. Similarly proportion of dry commercial pepper obtained from the green be is also not a constant factor in most of the varieties. The dry w obtained varies from 33 to 43 per cent in the case of Travar varieties and 38 to 42 per cent in the case of Malabar types appendix VI). Thus by selecting suitable types the outturn o pepper plantations could be increased by 5 to 10 per cent.

(iii) *Selection of 'standards'*

The pepper plant, being a climbing vine is grown on other li trees or supports known as 'standards'. In Indonesia, Sarawak other producing countries, dead-wood posts are fixed at interva 7 to 10 feet and the pepper vine is planted at the base of these st ards. In India, however, live trees are generally preferred. W any of the existing jungle tree is used as 'standard' in Travanc Cochin, the 'standard' consists largely of the local *murukku* (*Erythrina indica*) and other garden trees in Malabar. Bein tropical plant, the pepper vine requires a humid and moist clim and the purpose of these living 'standards' seems to be to prov these conditions besides serving as supports for the climbing vi The effect of various kinds of 'standards' on the successful gro of vines has not yet been studied. If there is no particular signi ance in having live 'standards', we should encourage the use of de wood posts of suitable dimensions in the plantations as is done other countries.

(iv) *Soil fertility*

Cultivators do not as a rule apply any manure to the pep gardens, especially when grown in big plantations. In most of areas, therefore, the soils were depleted and the crop was repor to give very poor yields. A rapid soil survey is necessary in or to determine the level of soil fertility in these areas.

In other producing countries where the gardens are regula manured with powdered bean-cake, fish guano and dried prawn fuse, the pepper vines are reported to respond well to manuring. T results of the manurial experiments conducted in India at the Ko Farm and at the Taliparamba Agricultural Research Station also ha shown that by proper manuring, the yield of our pepper garde could be increased considerably. Suitable experiments should, ho ever, be conducted in representative tracts to decide their manur requirements. The results should be utilised for stepping up p duction.

Control of pests and diseases

Pests and diseases affecting the pepper vines are not many and economic loss on this account is not serious. However, in some ars, the attack of '*Pollu*' disease results in the hollowing of the ries and assumes importance, while root-diseases predominate in ne other years. Though suitable remedial measures and cure are available for these, breeding for disease resistance appears to ve great potentialities. Among the Malabar varieties, *Kalluvalli* d *Karim cotta* show greater resistance to these diseases while *Karianchi*, *Valiya Kaniya Kadan* and *Karuvalli* are the more resistant es in Travancore-Cochin. Apart from finding out suitable remeis for these diseases and pests, breeding work for combining the ease resistance of these varieties with other economic characters ould also be attempted from among the wealth of plant material ailable in different localities.

) *Improving methods of storage*

Pepper is generally immune to the attack of insects. But it has en found that the presence of moisture induces mould formaon and as a result of such mouldiness, insect infestation s also been found to occur, in the stored products. The types of sects which have been identified are (1) the book-lice or psocids,) cereal mites (3) grain beetles and (4) cigarette beetles. Among ese, incidence of book-lice was found to be the maximum. In der to control insect infestation and check mould formation, the isture content has to be reduced. It is reported that a moisture ntent of 10 per cent is the marginal limit and any excess moisture yond this limit will encourage mould formation and insect instation. The optimum moisture content and other factors should investigated. Pepper also re-absorbs moisture from the humid nosphere during storage and transit and this factor should also be ken into consideration while suggesting optimum limits of moisture commercial samples.

i) *Technology*

The essential oil contained in pepper has some commercial uses. ie technological possibilities of extracting this oil should be investited. However, pepper which is unfit for other purposes should ly be utilised for this purpose. The commercial possibilities of anufacturing white pepper should also be explored.

iii) *Maintenance of statistics*

The unsatisfactory nature of the statistical information available the country has already been pointed out. Even in regard to the imary statistics concerning the acreage and production of pepper, de differences have been noticed between the official and trade timates. Nor is the position better in regard to stocks and carryer or internal utilisation. Such statistics are vital to develop the lustry on rational lines and should, therefore, be maintained.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

(i) *General outlook*

Owing to the general shortage of supplies in other prod countries, the present demand for Indian black pepper is like continue for some years. As supplies in Indonesia and other cou of South-East Asia improve the price of this spice cannot be maint for long at the present high level.

The Indian pepper industry should, therefore, utilise the pr opportunity and take early steps to reduce the costs of produ and distribution so as to enable it to offer more competitive p in the foreign markets.

(ii) *Need for agricultural research*

Very little research work has been carried out with a vie improving the quality and yield of the pepper crop in India. S work has been done mostly in the Madras State with the fina assistance from the Indian Council of Agricultural Research w most of the other producing States have not bestowed adequate at tion for the scientific development of this industry. There is ur need for research for reducing the cultivation expenses and pro tion costs by adopting scientific methods of farming. It is, theref recommended that two regional research stations should be sta in the two important producing areas of Travancore-Cochin Malabar and two regional sub-stations at Sirsi in North Kanara some suitable hill areas of Assam. We understand that the soil climatic conditions in Assam are largely similar to those of the M bar coast and that this State offers great scope for extending cultivation of pepper. Investigations should, therefore, be carr out for popularising pepper cultivation in various parts of Assam

In order to minimise the expenditure on staff and equipment is suggested that these regional research stations and sub-stations pepper should be utilised for conducting research on other spices a allied crops as well, as far as possible.

(iii) *Increasing internal production*

For reducing the gap between the present world demand a supply, it is necessary to step up internal production of black pepp In spite of the stimulus provided by the post-war boom in prices, acreage under pepper cultivation has not shown any appreciable crease. In order to increase internal production of this spice, recommend that steps should be taken to encourage (i) intens methods of cultivation in all the existing pepper gardens, (ii) placement of old and uneconomic vines in all the existing plantati and (iii) cultivation of pepper in new areas wherever there a possibilities of extending the crop.

(iv) *Better basis for crop estimation*

Although all-India forecasts of the pepper crop are regula published, wide differences have been noticed between the offic crop estimates and those given by the trade, particularly in regard the annual outturn of the crop. As such conflicting estimates rea unfavourably on the export prices, there is urgent need for reconcili the differences by adopting a more reliable basis for the preparati of official crop estimates. Pilot sample surveys should therefore undertaken to determine the normal yield of the pepper crop in t

erent producing areas. Such surveys should also examine the sibility of enumerating the total number of old and new vines in erent plantations so as to determine more accurately their yield- capacities.

Special agency for export promotion

The main markets for Indian black pepper are the United States America and the United Kingdom. While other pepper producing ntries have set up special organisations in these foreign markets promoting their countries' exports, the Indian export trade is t up on the traditional pattern and is carried on in an isolated ner. Consumer research or modern methods of publicity and s promotion are absent. The hands of the Government of India de Representatives abroad are so full that they cannot be expect- o devote whole time attention to this commodity alone. It is re- mended that the Central Government should set up a special ort-Promotion Agency in New York and another in London with sole object of expanding India's trade in pepper and other spices co-operating with similar agencies already functioning at present. Export-Promotion Agency which has its head-quarters in New k should be entrusted with the work in the U.S.A., Canada and r American markets while its counterpart in London should be ed to take over the publicity and sales promotion work in the .. and other European markets.

Documentary films

Exhibition of documentary films will be an effective aid to greater licity and sales promotion. The Government of India should pare documentary films showing the various stages of the pepper stry and of other spices and arrange for their exhibition in all ortant markets, both present and potential.

Exploring new markets

Although bulk of the pepper exports from India are to the U.S.A., r hard currency areas such as Mexico, Cuba, Colombia, Bolivia, emala, Haiti, Eucadar, Honduras, Panama and Salvadar have occasionally taken small consignments of this spice from India ng the post-war period. The Government of India Trade Re- entatives in foreign countries should survey the potentialities of loping these new markets.

Uniformity in grade standards

Considerable inconvenience and financial loss were recently caus- o the Indian shippers due to the detention of some consignments lack pepper in America on the ground that these shipments e insect-infested. Complaints regarding other factors of quality also sometimes heard. In order to maintain the reputation of an black pepper and to give satisfaction to the foreign con- ers, it is necessary to frame suitable grades and grade specifica- for this commodity under the Agricultural Produce (Grading Marking) Act, and encourage the shippers to conduct ex- trade on the basis of these grades and grade specifications. se standards of quality should then be included in the trade con t terms also.

It should be remembered that good quality Indian black pepp superior to pepper produced by any other country and ensuring quality of the pepper exported would, therefore, be a sure wa retaining the present favourable position in the world market.

(ix) *Standardising trade contract terms*

The present contracts for foreign exports of pepper and c spices are made largely according to the terms prescribed by American Spice Trade Association of New York or the General duce Brokers' Association of London. None of these associat provides for mutual allowances of quality or for arbitration facil in India in the case of disputes. The Indian industry should fr standard contract terms of their own providing for these facil and utilise the present opportunity in order to persuade the for buyers to accept the same.

(x) *Uniform weights in West Coast markets*

The unit of weight which is adopted for sale of pepper in West Coast markets is one candy. But the candy is found to v from 600 to 700 lb. in different markets. Even the pound was found to be uniform. The Governments of Madras and Travanc Cochin should agree to take early steps to adopt uniform weight all the West Coast markets.

(xi) *Regulation of markets*

The returns of the small producers are reduced by various ded tions and customary charges prevailing in the West Coast mark The deductions on account of driage and quality are often found work hard on the producers. Improper deductions and market pr tices should be eliminated by bringing all important assembl centres in the West Coast within the scope of the Regulated Mark Act as soon as possible.

(xii) *Co-operative marketing*

The role of co-operative agencies in the marketing of pepper found to be insignificant. In a crop like pepper where nearly 60 cent of the cultivated holdings are small, the benefits of co-operat marketing are obvious. There is urgent need, for organising P ducers' Co-operative Societies for the sale of pepper in all the prim markets. These societies should be gradually combined into Dist Unions and brought under a State or Regional Federation. Central and State Governments should encourage the formation such co-operatives and give all facilities to these federations undertaking the export trade. Such facilities may also include lo or subsidies for construction of warehouses, etc. and liberalisation rules governing the issue of co-operative loans.

Wherever there is no scope for organising co-operative societ the possibilities of establishing licensed warehouses should be c sidered.

(xiii) *Improving road communications*

Most of the pepper producing areas are concentrated in the h tracts at the foot-hills of the western ghats. Opening up of th areas by means of proper road communications would make th areas more accessible and facilitate the marketing of the produc

(xiv) *Market-news service*

Although the post-war boom in pepper prices has made the producers alert, most of them are still ignorant of the market conditions and do not, therefore, derive the full benefits of the prevailing high prices. This is further complicated by the speculative activities of the trade. In order to determine his selling price, the sellers in the primary and secondary market should possess up-to-date information regarding arrivals, stocks, despatches and prevailing prices at various centres. Arrangement should be made for supplying such information regularly to the sellers in the primary and assembling markets by organising a 'market-news' service in the important producing States, including daily broadcasts of these particulars from the regional stations of the All India Radio.

(xv) *Central plan for development*

We are convinced about the scope and urgent need for the development of the pepper industry in India. In spite of the unprecedented rise in post-war pepper prices, the producers have not made any effort to develop the industry on improved lines. Nor has the State Governments bestowed adequate attention in this regard. Being preoccupied with food production, the State Governments concerned have clearly indicated that they are not in a position to pay proper attention or to divert funds for the development of pepper and other spice crops. The Central Government should, therefore, step in and organise the development of this valuable Indian industry on scientific lines. For this purpose, we recommend that the Government of India should create a Pepper Development Fund and earmark from the export duty a sum of not less than one crore of rupees, for organising and subsidising all the development measures such as supply of standards, raising of special nurseries, supply of rooted cuttings, replacement of uneconomic vines, extension of cultivation, control of pests and diseases, provision of better storage facilities, framing of grade standards, promotion of orderly marketing and dissemination of agricultural information regarding production, marketing, etc.

As a first step, the Central Government should consult the State governments concerned and prepare an integrated Ten-Year Plan for the development of the Indian pepper industry. This plan should also be executed expeditiously.

The governments at the Centre and of the producing areas, as well as the country at large have been greatly benefited by the post-war boom in pepper prices. The duty collected on the exports of pepper by the Government of India during the last four years has amounted to Rs. 12.94 crores of which Rs. 7.34 crores were contributed by Travancore-Cochin and Rs. 5.60 crores by Malabar including South Kanara and Coorg. The pre-war value of annual exports from India amounted to hardly Rs. 4 lakhs which at the present time has increased to Rs. 23.17 crores, more than half of which was earned in dollars. The importance of this industry cannot be maintained unless the Central Government steps in and develops the industry on the lines indicated above.

(xvi) *Organisation and control*

We have carefully considered the type of agency which should be entrusted with the task of organising and controlling the developmental measures envisaged under the proposed Ten-Year

Pepper Plan. We recommend that a small central advisory co mittee for development of spices should be constituted by the G ernment of India. This central committee should be assisted by thr regional advisory committees, one for Travancore-Cochin, second f Malabar and South Kanara and the third for Mysore including Coo and North Kanara. The regional committees should consist of n more than ten persons nominated by the State governments repr senting government officials, producers, traders and other interes concerned, besides the Chairman who should be the Agricultur or Development Secretary of the regional governments concerne The regional committees which will not ordinarily meet oftener tha once in six months should review the progress of the Ten-Year Pepp Plan in their respective regions and offer their advice on all scheme put up to the government. While the central committee will b responsible for planning and coordination as well as allocation o funds for various developmental measures, the responsibility for th successful working of the Ten-Year Plan and for proper utilisatio of the funds provided therein will rest with the three regional advi sory committees.

We have recommended the setting up of separate regional committees in the three important pepper-growing areas and have suggested decentralisation of the functions with the sole object of enabling the respective regions to make more effective use of all the local resources and to enlist public co-operation in the development of this important sector of our national economy.

CHAPTER II

CARDAMOM (*ELAICHI*)

1. General outlook

Actual figures of cardamom production in different countries of he world are not available. But judging from the quantities ex-orted from different sources, the principal cardamom producing countries are India, Ceylon, and Indo-China. The crop is also culti-vated to some extent in Central America, particularly in Guatemala. The relative importance of these countries may be seen from Table I.

Table I

Annual exports of cardamom from different countries of the world (Quantity in tons)

Sources	Pre-war				Post-war			
	1937	1938	1939	Average	1947	1948	1949	Average
ndia	650	650	850	716	750	850	1150	917
ndo-China	500	500	500	100	100	*100	100	100
Ceylon	150	200	150	167	100	100	100	100
Total	1300	1350	1500	1316	950	1050	1350	1117

* estimated average

The average world trade in cardamom has thus varied from 1316 ons to 1117 tons and may be reckoned at nearly 1200 tons. It will e seen that both during the pre-war and post-war periods India has been the largest supplier of this spice in the world markets. The verage pre-war exports from India amounted to 716 tons which ncreased during the post-war period to 917 tons representing 82 per ent of the international trade. The shares of Indo-China and Ceylon n the world trade during these periods are relatively small and have ot exceeded 100 tons each. The exports from Guatemala consisted nostly of seeds.

Besides being the largest exporter, India forms the only source of true cardamoms in the world markets. The true cardamoms are obtained from the plant *Elettaria cardamomum* which is widely grown in India. These are valued for their higher oil content and aromatic properties and are considered superior to the bigger sized cardamoms obtained from various species of *Amomum* grown in Sikkim, Nepal, Siam, Java, and a few other tropical countries.

Cardamom has an agreeable aromatic odour and is largely used for flavouring and medicinal purposes. In the eastern nations, this article is used for chewing with betel leaves and as a masticatory

while in northern Europe, particularly Sweden, Norway, Germa and the U.S.S.R., the cardamom seeds are powdered and wid utilised for the flavouring of cakes and pastries and for other culin purposes. It is also used for flavouring of liquors. In medici cardamom is employed in the preparation of tinctures and for extraction of oil. The oil content is by far larger in the seeds than the husk but the oil obtained from both the husk and the seeds h identical properties and is largely used in flavouring beverages.

The average world demand for all these purposes, is howev limited and is reckoned at 1200 tons. As bulk of this requirement already being met by supplies from India, the scope for furth expansion of India's foreign trade in this product is limited. Inste of trying to expand the foreign trade, steps should be taken to reta the position already gained in the world markets.

2. Position of the industry in India

(i) *Some facts regarding cultivation*

In India, cardamom grows wild in many portions of the weste ghats. It is also cultivated in this region at altitudes varying fro 2500 to 5000 ft. The plant prefers a warm and humid atmosphe and a temperature ranging between 50° to 95° F. and thrives best i the shade provided by the lofty forest trees. The crop requires plentiful supply of humus and a fairly distributed annual rainfall o over 60 inches. On account of these limitations, the cultivation o this crop is concentrated in the moist ever-green forest lands of Sout India.

The cardamom plant is a tall, herbaceous perennial with branchin underground root-stocks from which arise a number of aerial leaf shoots. As these shoots die, new ones are formed in their place At the base of these aerial shoots one or more branches of flowe arise. The flowers which are borne in panicles open in successio from the base to the top and develop into fruits. The fruit is a tr locular capsule and generally contains 15 to 20 hard brownish blac seeds having a thin mucilaginous coating. The shape of the fruit varies according to the variety of cardamom, but is generally plae green to yellow in colour when ripe and the fruit-wall or pericarp i firm and smooth.

Depending on the size of the fruits, there are broadly two varietie of cardamoms recognised in India. They are (1) *Elettaria carda momum* var. Major Thw comprising of the wild indigenous type an (2) *Elettaria cardamomum* var. Minor Watt comprising of all th cultivated races included under the names of Mysore and Malaba cardamoms. The wild cardamom is a most primitive variety fro which the cultivated forms are derived but all these varieties an races are interfertile and therefore produce many hybrids showin considerable variation in the size of the plant, the nature of the lea surface and flowering panicles and also in the size of the frui capsules.

The most important cardamom-growing region in India is Travan core-Cochin. In this State, the crop is grown in the high ranges an is largely distributed in the regions known as the Cardamom Hills This is grown largely as a single crop on a plantation basis, the siz of the plantation often ranging from 50 to 200 acres. Bulk of th

Fig 8. *Elettaria cardamomum*—a plantation [*Courtesy* C. S. I. R.]

Fig. 9. *Elettaria cardamomum* var. Minor with trailing panicles (*Courtesy* C.S.I.R.)

(*Courtesy* C.S.I.R.)

Fig. 10. Different grades of Mysore cardamom

Fig. 11. Capsules of different cardamom varieties.

(*Courtesy* C.S.I.R.)

rdamom of commerce is produced in this region. The next im-
ortant cardamom-growing area is in Mysore State, particularly in
.e Munzerabad *taluka* of the Hasan district. The cultivation in this
:ate is also similar to that of the Cardamom Hills. In Coorg, where
ıe crop is cultivated to a smaller extent, the cultivation is largely
ɔnfined to the slopes of ever-green forests and is practised as shifting
ıltivation. After a lapse of 10 or 15 years, the cropped area is
.lowed to revert to jungle and new plots are selected for raising fresh
ardamom crop. Certain portions of Malabar, Nilgiris and Madura
istricts of the Madras State and North Kanara district in the Bombay
tate also grow cardamom, but the production from these sources is
ɔmparatively small and is often collected as minor forest produce.
: appears that in all these places, the cost of clearing the jungle is
eavy and the planters also experience scarcity of labour. Even if
uitable lands are available, the scope for extension of cultivation is,
herefore, said to be limited.

Generally, cultural operations commence in February-March.
)uring this month, a suitable piece of virgin forest land is chosen
nd cleared of all under-growth leaving the big trees undisturbed to
rovide shade. Small pits are dug in the cleared area at a distance of
0 feet and with the onset of the south-west monsoon rains, two year
ld seedlings or rhizomes from the old cardamom crop with their
.erial shoots are planted at the rate of two per pit. In August-
September, one or two weedings are given and stagnant water is all
lrained off. In the second year also sufficient attention is paid to
veeding and drainage in the plantation and these operations are con-
inued thereafter only occasionally or according to the labour facili-
ies available. The crop begins to yield from the third year onwards
nd annually thereafter. Harvesting commences in August-September
ınd lasts upto January or even April. As the cardamom plants do
ıot ripen uniformly, the harvesting of the crop is spread over a
ong period. The fruits are gathered at intervals of 30 to 40 days
ınd the harvesting is completed in five or six instalments. The first
'ield is poor and amounts to hardly 20 lb. of dry capsules per acre.
3y the fourth year, the yield increases up to 30—40 lb. and by the
.fth year a normal crop of 60—70 lb. is obtained from the planta-
ion. The average yield was much higher and used to vary from
00—150 lb. per acre in a disease-free plantation. Both Malabar and
Mysore varieties of cardamom give about the same yield. The
:he present reduced yield of the crop is attributed largely to the
-ack of seasonal rains and incidence of pests and diseases. Among
.he diseases the mosaic, also called the 'marble disease' or *Katte*
lisease, is the most important. It is transmitted by an insect
vector, and is characterised by the mottling, curling of leaves and
degeneration of the clumps. By systematic roguing of affected
plants and planting of disease-free seedlings raised in special nur-
series, this disease has almost been eliminated from the growing
areas in North Kanara. These methods should be employed in other
areas also for the eradication of the disease.

Among the insect pests, thrips cause the most serious damage.
Besides reducing the yield of the plants, they damage the wall of the
ovary and greatly reduce the market value of the produce. Regular
dusting with 'Gammaxene' has been found to be an effective remedy
against these pests and is widely adopted in big plantations on a

systematic basis. The Agricultural Department of the respecti States should, therefore, popularise these methods of disease and pe control particularly among the small producers. As very little ca be done by way of human effort to obtain seasonal precipitation great emphasis should be placed on this item of extension an development work by the respective Agricultural Departments.

After harvesting, the produce is dried in the sun or in speciall built drying houses by means of artificial heat. The devices used fo artificial drying vary from sheltered mud platforms heated by a slo fire from beneath to a large drying house or kiln heated by flue pipe The fruits kept for drying are spread out thinly and are frequentl stirred to ensure even drying. The time taken for preparing the sun dried cardamom is 3 to 5 days while the produce prepared in the dry ing houses or kilns by artificial heat takes only 48 hours. The carda mom so dried also retains its green colour and obtains fancy prices in the markets. The sun-dried produce, on the other hand, retains the mucilaginous coating on the seeds and therefore possesses a characteristic sweetish aroma. The dried capsules are then rubbed by hand and winnowed to remove other plant material and foreign matter. The out-turn of dried capsules by these methods varies from 20 to 28 per cent of the green harvested produce.

Sometimes fumigation chambers or sulphur boxes are specially constructed and the cardamom fruits are bleached by exposure to sulphur fumes. The final product is known as the white cardamom or the bleached cardamom of commerce. It is a distinct trade quality. Bleaching is done largely in Haveri, in the Bombay State, which obtains bulk of raw supplies from the Mysore State. Bleaching improves the colour of the outer skin, and preserves better during storage.

(ii) *Crop estimates*

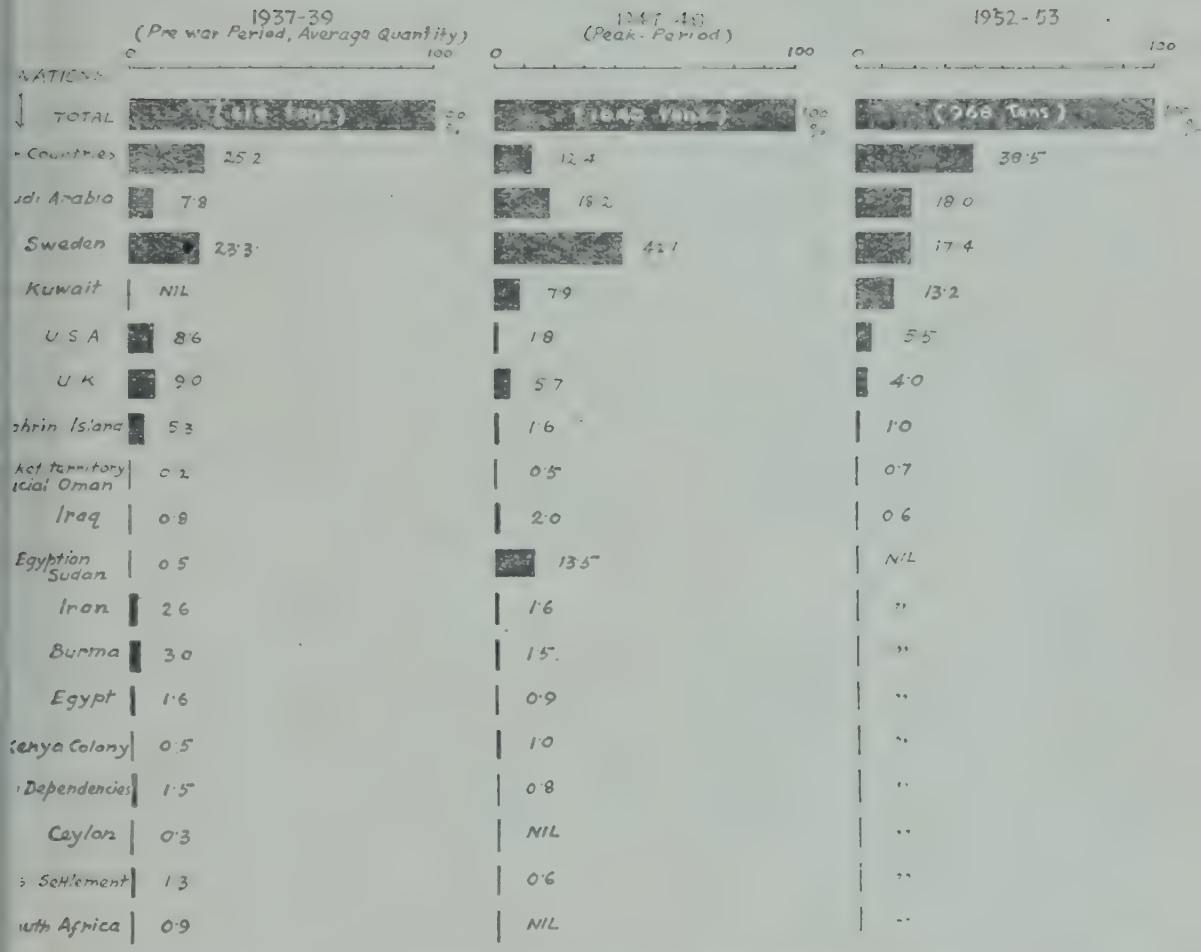
Reliable statistics of the cardamom crop are not available in India but from the information obtained from official sources and the trade, the area and production of cardamom in the country during 1951-52 have been estimated as in Table II.

TABLE II

Estimated area and production of cardamom (Elettaria cardamomum) *in India during* 1951-52

Principal producing States	Area in acres	Production	
		Quantity in tons	Percentage
Travancore-Cochin	55,738	800	55·8
Mysore	27,301	350	24·4
Coorg	11,908	200	13·9
Madras	15,808	75	5·3
Bombay	619	8	0.6
Total	111,374	1,433	100.0

Fig. 12. A three-year old healthy plant of cardamom



g. 13—Percentage export of cardamom from India to different countries of the world.

During 1951-52, the total cardamom crop in India amounted to 1433 tons or approximately 1500 tons. Travancore-Cochin is the principal cardamom-producing area in India and this State accounts for 800 tons representing 55·8 per cent of the total crop of 1951-52. Mysore accounted for 350 tons or 24·4 per cent while the production in Coorg amounted to 200 tons or 13·9 per cent. These are the three major cardamom-producing States and among these three States, over 94 per cent of the Indian crop is distributed. Production in other parts of Madras and Bombay State was comparatively small.

The total cardamom crop of 1951-52 is considered to be below normal. The prospects of the 1952-53 crop are better on account of timely receipt of rains and a normal crop of about 1800 tons was expected.

Due to the inaccessibility of most of the producing regions there are many practical difficulties of estimating the acreage under the cardamom crop (*vide* appendix XIV). The mode of cultivation which varies from pure plantations to shifting cultivation also renders the estimation of acreage difficult. Similarly, the absence of reliable figures of normal yields of the crop has also been a handicap in estimating the total out-turn of the crop. Considering the importance of cardamom particularly in the agricultural economy of the West Coast States, early steps should be taken to evolve a suitable method for estimating the area and yield of this crop and publish regular forecasts of this crop on an all-India basis. Pilot sample surveys should be undertaken in this connection to determine the normal yield of the crop in the different producing areas.

(iii) *Exports*

There are no imports of true cardamom into India. As already stated, India is the largest exporter of this commodity and forms the main source of supply of cardamom in the world markets. The average pre-war exports from India amounted to 661 tons annually and were valued at Rs. 31·5 lakhs. The quantity and value of the exports have increased since then and during 1952-53, 968 tons of cardamom valued at Rs. 163·7 lakhs were exported from India (*vide* appendix XV).

The main markets for Indian cardamoms is Sweden and nearly one-fourth of the Indian cardamoms is exported to this country. Sweden imports cardamom both from India and from Ceylon. While the Indian cardamom is used largely for flavouring cakes and pastries the imports from Ceylon are exclusively used in the flavouring of liquors. The next important market for Indian cardamom is Saudi Arabia. It is only since the beginning of world war II, that this country has become our customer. Both Sweden and Saudi Arabia are important markets and nearly 40 per cent of the Indian exports are accounted for by these two countries.

The exports of cardamom from India to the U.S.A. and Canada have, however, been small and the recent trend of shipments also shows a decline. The reduced offtake of the U.S.A. is attributed to competition from Guatemala which supplies cardamom in the form of seeds. The Indian Government Trade Representatives and the proposed Export Promotion Agencies should keep in touch with the market conditions in these countries and see that the exports from India are fully maintained.

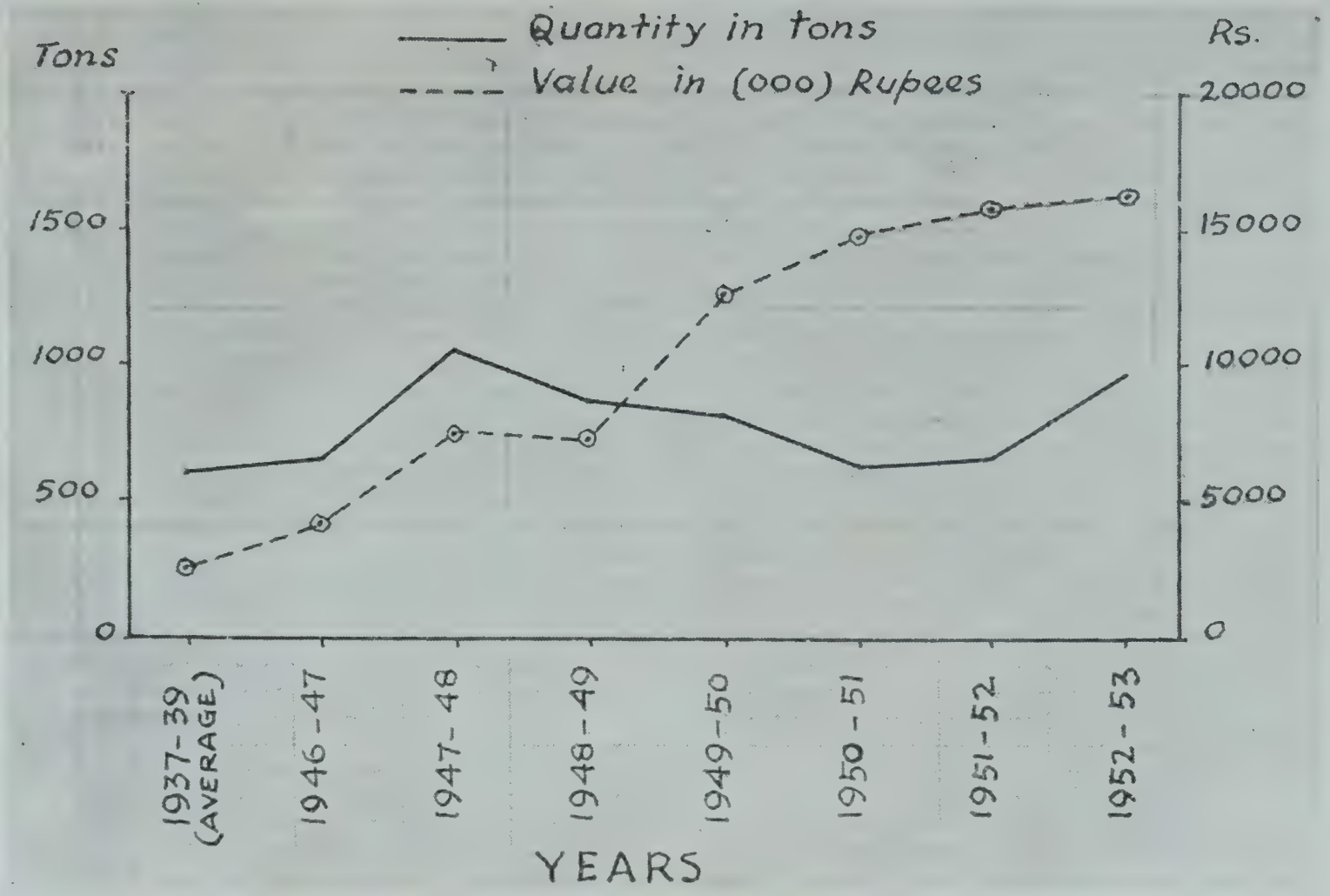


Fig. 14. The trend of export of cardamom from India

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he foreign exports can be grouped under three main qualities, ely, (1) green cardamoms (2) white of bleached cardamoms and eeds, the estimated share of each being as follows.

Green cardamoms	..	80 per cent
White or bleached cardamoms	..	10 do.
Seeds ..	..	10 do.
Total exports	..	100 do.

he green cardamoms are prepared by drying the harvested fruits ie sun or by means of artificial heat while the white cardamom ists of the bleached capsules. Bleaching is done by exposing capsules to sulphur fumes. Both in the green and the white amoms, there are different grades recognised by the trade. For nce, extra bold, and *motta* green are some of the trade classi- ions in the green cardamoms while white cardamoms are desig- d as No. 1, 2, and 3 with varying proportions of A, B and C ities. Nearly 80 per cent of the exports take place as green amoms. The exports of white or bleached cardamoms and as s are comparatively small.

he number of grades and their specifications has been found to considerably in different places. In order to have comparable e quotations, it is necessary to frame standard grades and grade ifications for the different qualities of Indian cardamom and urage trading on the basis of standard qualities.

Cardamom obtained from different regions is found to have ific characteristics as detailed in Table III. These can be utilised aming suitable grade standards.

TABLE III

Characteristics of Elettaria cardamomum

ariety	Length of fruit (c m.)	Weight of seeds%	Weight of husk%	Volatile matter in crushed seeds%	Ash %	Yield of oil from dry seeds %
ar	1.87 × 18.7	78.9 × 0.9	21·1	19·0	3·90	8·4
e	2.10	72·3	27·7	18·3	5·05	7·3
labar)	1.91	73·3	26·7	20·0	4·30	6·4

or export to the countries of the Middle East, cardamom is ed in new double gunny bags. The superior twill gunnies are ys used for this purpose. Shipments of cardamom capsules to pe and America are packed in cases having a standard size of . × 19 in. × 21 in. or 19 in. × 19 in. × 24 in. while those of amom seed is packed in cases 16 in. × 16 in. × 20 in. the capacity ch case being approximately 112 lb. or 1 cwt.

Internal trade

hough India exports large quantities of cardamom to the foreign kets, the internal trade is also equally important in this spice.

It is estimated that only two per cent of the annual crop is ut in the main producing areas of South India and the remaining tity is almost utilised in the markets of upper and northern The marketable surplus from Travancore-Cochin is despatch Calcutta, Kanpur, Delhi, Amritsar, and Bombay and is sold th commission agents in these distributing markets. Bulk of Mysore produce moves to Haveri in Bombay where it is bleached graded before further despatch. Part of it also moves *via* Coc Mangalore where along with the Coorg produce it is bleache exported as such.

In spite of the importance of internal markets, very little inf tion is available in the producing areas as regards the demand various centres in northern India. This lack of market intelli coupled with the better crop during 1952-53 have created almo slump in the South Indian markets. The marketing departmen these States should, therefore, take early steps to contact the au rities concerned in Calcutta, Kanpur, Delhi, Amritsar and Bor and examine the possibility of despatching larger quantitie these areas. In order to encourage such a movement we recomm that specially reduced station-to-station rates should be charged the rail transport of cardamom from the main producing area Travancore-Cochin, Mysore and Coorg to the distributing centre Calcutta, Kanpur, Delhi, Amritsar and Bombay.

Besides the true cardamoms of South India the internal trad reported to consist of considerable quantities of a cheaper inferior variety of imported produce which is of Sikkim ori This produce is imported through land frontier routes first into assembling markets of West Bengal such as Kalimpong, Sonada Darjeeling. From here, the produce is moved by air to Calcutta then by rail to Delhi for further distribution in Rajasthan and ot consuming centres in Upper India. As these cardamoms have depressing effecting on the level of prices of true cardamom Indian origin the question of regulating their distribution has to carefully considered. These imported cardamoms are bigger in and probably belong to the *Ananum* species.

(v) *Prices*

Due to large accumulation of stocks, the prices of cardam remained depressed in all internal markets during world war With the cessation of hostilities, there was improvement in foreign trade as well as in the prices of this commodity. The pr have steadily increased in all the markets.

For example, the price of green cardamom amounted to Rs. per maund at Mangalore during 1945-46 which steadily rose to maximum of Rs. 937 during 1950-51. The prices declined sligh to Rs. 932 in 1951-52 but the recession started during this per continued and the prices of this product amounted to Rs. 603 dur 1952-53. A similar trend was noticed in other important mark also. The decline in the present price level is attributed to larger crop during 1952-53 (*vide* appendix XVI).

Although there has been a decline recently, the current pri are still nearly five times the 1945-46 prices and are considered high by the average consumers in India. Unless more favoura

rices are quoted by cutting down production costs to the minimum, ne consumption of this spice is not likely to go up.

It has been noticed that the consumers in various markets have istinct preferences for different qualities of green and bleached ardamoms and each superior quality gets a premium of Rs. 1/2/- er pound. All such processing and grading is, however, done by the erchants and middlemen. The costs involved could be reduced nd the produce sold at more competitive rates if the producers nemselves undertake to pool their produce and do the grading efore selling the produce.

vi) *Assembling and distribution*

After harvesting, cardamom is dried and the produce is taken to ne assembling markets without further processing. The main ssembling markets for the produce of Travancore-Cochin are ituated in the Madras State bordering on the eastern side of the ardamom Hills, the principal centres being Cumbum, Bodinaya-anur, Thevaram and Pattiveeranpatti. In the Mysore State, aklaspur is the most important centre for the assembling of the ardamom crop. Small quantities of the crop are also handled at Iudigere and Chickmagalur. In Coorg bulk of the crop is assembled t Mercara but a small portion of it also moves directly to the ex-orters and merchants at Mangalore market.

The list of important assembling markets for cardamom and the pproximate quantities handled at each centre are given in Table V.

TABLE IV

Assembling markets and quantities handled by them

Producing region	Name of the assembling market	Quantity handled annually in tons
Madras	Cumbum	200
	Bod inaykanur	150
	Thevaram	80
	Pattiveeranpatti	80
	Kombai	70
	Pannaipuram	70
	Uttamapalayam	50
	Kudalur	50
	Rajapalayam	30
Mysore	Saklaspur	275
	Mudigere	50
	Chickmagalur	15
Coorg	Mercara	200
	Total	1,320

The produce grown in big plantations is generally brought these assembling centres by the planters themselves while owners of small plantations sell their produce to the itinera merchants who transport the same to these centres. The method sale adopted in all these assembling markets is the auction syst and the producers generally get a competitive price. The buyers a either local merchants or the agents of shippers. The shipp themselves also participate in the auction at some places. Wh Bodinaykanur and other assembling centres in the Madras Sta appeared to be better organised, the condition of even the assembli markets in Mysore and Coorg was not found to be satisfactor Neither the sellers nor the local merchants in these centres ha adequate information regarding the supply and demand position of the prices of the produce in other markets and were not therefo able to derive the full benefits of the auction system of sale. Th situation should be improved by organising an efficient market-new service particularly in these two regions.

A small proportion of the cardamom crop is handled in thes assembling markets by the members of co-operative societies. Th societies working at Saklaspur and Mercara have also shown goo progress (*vide* appendix XVII). The main handicaps experienced b these societies are in respect of finance and facilities for storage o the produce. With adequate financial assistance from Apex Bank and construction of larger godowns, these societies could handl larger volume of business. The Central and State governments should offer special facilities for encouraging sales by such co-operative institutions.

The buyers at these assembling markets clean the produce and sort it out into different trade qualities. They also sometimes do the bleaching and prepare white cardamoms. Shipments take place arte settling the rates by cable and on receipt of the firm order. Some of the exporters in the Madras State who have branches in London and New York appeared to carry on negotiations with their foreign customers through these local branches. The main centres for distributing cardamom in India are Bombay, Calcutta, Kanpur, Delhi and Amritsar. Sales are arranged through commission agents appointed in these markets.

The charges incurred in the assembling of the produce have been found to vary from 8 to 10 per cent of the market price and an equal amount has to be spent further on railway freight and merchandising charges. Standard weights are not also used in all these markets. The Saklaspur maund consist of $28\frac{3}{4}$ lb. as against the standard maund of 822-2/7 lb. Similarly, the *thulams* of Madras were found to vary from 21 lb. to 25 lb. in various centres. There is considerable scope for improvement in these markets by organising regulated markets for this commodity.

3. Research, technology and development

(i) *Opening new research stations*

Although the need for scientific aid to cardamom industry was recognised as early as 1940, investigations for the improvement of this industry have not been undertaken in any of the major producing

Fig. 15. Healthy (extreme left) and diseased leaves of cardamom.

gions. Excepting the researches carried out at the two experi-ental stations of the Madras Government at Singampatti and ılparai, no systematic effort has been made for the improvement of is crop either in the main producing areas of Travancore-Cochin or Mysore and Coorg which are also important cardamom-growing gions in the country. The need for opening two additional research ıtions for this crop is obvious. One research station at Saklaspur uld investigate the local problems of both Mysore and Coorg. The ıer stations could be located in Cardamom Hills for studying the oblems of Travancore-Cochin. These research stations should con-ıct particularly cultural and varietal trials for improving the yield .d quality of the local cardamom. As cardamom cultivation entails earance of forests, the effects of such deforestation should also be refully determined at these research stations.

The cardamom research stations at Madras have found out that gular spraying with 'Gammaxene' is an effective remedy for the ntrol of thrips and other insect pests while the experiments con-ıcted at Sirsi in North Kanara district of the Bombay State have own that complete eradication of the 'mosaic' disease is possible r roguing the diseased plants and planting disease-free seedlings. ıese and other results obtained should be given wider publicity and itable arrangements should also be made for their extension work r the Agricultural Department of the respective States.

) *Supply of improved planting material*

The cultivated varieties of cardamom are broadly classified as the alabar and Mysore types. The Mysore type of cardamom known as e Munzerabad variety has smooth leaves, erect panicles and larger uits having a more or less circular cross-section. This is the gger and more vigorous type. The Malabar cardamoms are smaller size. It has prostrate panicles and spherical fruits which are llow when fully ripe. Nearly two-thirds of the present area in the rdamom Hills is under this type and the remaining one-third is own under the Mysore type. One advantage claimed for the alabar variety is that these plants have prostrate panicles and their uits are, therefore, beyond the feeding zones of thrips which cause eat loss of the crop in these areas. In the case of the Mysore type, e fruits and branches are above the ground and are, therefore, sily accessible to the attack of these insects. The Mysore variety quires also seasonal rains in November-December failing which e yield of the crop is greatly reduced whereas the Malabar type is ore resistant. For these reasons, the planters of Travancore-Cochin em to prefer the Malabar type. Considerable difficulty is experi-ıced by the planters for obtaining supplies of disease-free and liable seedings and rhizomes. The first item of development should to organise adequate supply of reliable rhizomes of the Malabar ıd Mysore types of cardamoms in Travancore-Cochin, Mysore and oorg.

i) *Manuring*

The planter knows fully the value of manuring but generally it is t a practical proposition in the big cardamom plantations. Well-tten cattle manure is applied but being in short supply, the planta-ons are divided into three or four blocks and manure is applied in

rotations once in three or four years. In addition, sheep and fis manure and leaves of phyllanthus embilica are also applied. Resu of manure-mixtures such as three parts of castor cake plus one pa of steamed bonemeal plus one part of pottassium chlorate have a given encouraging results in certain areas. These investigatio should be carried out in other regions also for confirmation befo extending them to the cultivators' fields.

(iv) *Transport*.

Many practical difficulties exist for the transport of cardamo from the producing areas to the various assembling markets owi to the absence of suitable roads. Transport is both difficult and cos ly. For instance, the owners of small plantations in the Cardamo Hills have to send their produce in head-loads and incur an expend ture of Rs. 1/12/- per head load of 40 to 50 lb. for transporting th produce for 10 miles down the ghats whereas in the case of lorrie the transport charges come to hardly four annas. Similar difficulti for the transport of cardamoms were also found to exist at Saklaspu and Mercara. Improvement of road communication in these regior would greatly help these small producers in the marketing of the produce.

(v) *Technological research*

In many countries of Europe, cardamom oil is used for medicina and industrial purposes. It is only in one or two places in India tha some research work has been done regarding the technological possi bilities of this crop. The preliminary investigations carried out a the Indian Institute of Science, Bangalore and the Kerala Soa Institute, Calicut have indicated that (1) the oil-content of differen varieties of cardamom varies from 3 to 7 per cent of the weight o the dried mature fruit; (2) the outer-coating or pericarp of th cardamom fruits also contains as much as 0·2 cent. of the carda mom oil; (3) the oils obtained from both the seeds and the pericar are identical and have the following specifications:

Specific gravity	—0.936 to O. 938
Optical rotation	+28° to 44°
Refractive index	1.4698 to 1.4620
Saponification value	96 to 156
Acid value	0.4 to 1.3

Although the technological possibilities of extracting oil fron commercial cardamom are thereby indicated, further progress o commercial utilisation has not been made.

4. Summary of conclusions and recommendations

(i) *General outlook*

The average demand for cardamom in the world markets is smal and is reckoned at 1200 tons annually. Since bulk of this demand i already being met by supplies from India, the scope for furthe expansion of India's trade in this product is limited. Instead o

to expand the foreign trade, steps should be taken to retain sition already gained in the overseas markets by maintaining iality of the cardamoms exported from India.

ternative uses for cardamom and cardamom oil

ce cardamom and cardamom oil have only limited uses, re- should be conducted to find out alternative uses for these cts. The National Chemical Laboratory at Poona and the il of Scientific and Industrial Research should investigate the ilities and also subsidise suitable schemes in this connection.

eed for new research stations

ronomic and botanical research on the cardamom crop have inadequate in all the producing areas. Considering the need entific aid in these problems, we recommend that two addition- damom research stations should be opened, one in the Saklaspur n of the Mysore State and another in the Cardamom Hills of ncore-Cochin. The regional research station at Mysore should the problems of Coorg also.

carcity of planting material

many plantations, great difficulty is experienced in obtaining le planting material. Early arrangements should, therefore, be to select suitable sites in the main producing areas and propa- seedlings and disease-free rhizomes so as to meet the require- of all the planters. A Five-Year Nursery Scheme should be red and worked in this connection.

ntrol of pests and diseases

periments conducted at Madras (Singampatti) and Bombay , have found out suitable remedies for controlling thrips and which take a heavy toll of the cardamom crop in India. The Departments of Agriculture should give wide publicity to these ial measures and include these as important items of their ion work.

ublish all-India crop forecasts

spite of the importance of the cardamom crop, particularly in onomy of Travancore-Cochin, Mysore and Coorg, reliable esti- of area and production are not available. The normal yield in the preparation of some of the crop estimates is also unreli- The Central Government should, therefore, conduct pilot e surveys to find out the normal yield in all the important cing areas and arrange to publish regular forecasts of area and of this crop on an all-India basis.

ncrease consumption in Upper India

e main demand for cardamom within the country is in the ts of Upper India. In order to enable the producers to sell at

cheaper rates and to reduce the costs of distribution it is recor ed that specially reduced station-to-station rates should be c by the railways for transporting cardamom from the producin of South India to the distributing centres of Upper India.

(viii) *Publicity in foreign markets*

The important foreign markets for Indian cardamom a countries of the Middle East and Europe, particularly Saudi and Sweden. The India Government Trade Representatives c ed and the special Export Promotion Agency we have prop the case of pepper should give wider publicity to the better and greater oil-content of the Indian cardamoms and take all p steps to help sales promotion in these markets.

(ix) *Uniformity in grade standards*

The Indian cardamom trade adopts various grades and specifications for export purposes. In order to make price quo comparable, it is necessary to frame standard grades and specifications on an all-India basis. Early steps in this di should be taken under the Agricultural Produce (Gradin Marking) Act. These standards of quality should then be in in the trade contract terms.

(x) *Premium for the producers*

The producers of cardamom do not as a rule clear the prod sort it out into different trade classifications. Such cleanin grading is done only by the merchants. In view of the premium obtained for the better qualities of cardamom, it wo more remunerative for the producers if they could themselves take to grade the produce before taking it to the auction floo

(xi) *Organising Co-operative Marketing Societies*

The co-operative societies engaged in the marketing of card particularly those at Saklaspur and Mysore, were found to do work. For want of better storage and credit facilities the volu business handled by these societies was comparatively small State Governments concerned and the Central Government provide these facilities and thus encourage the formation of cooperatives. The facilities may be in the form of loans and dies for the construction of warehouses and liberalisation of th governing the issue of loans by the societies.

(xii) *Regulation of markets*

The charges for marketing of the produce which are paya the producers in many of the markets amount to about 10 pe of the prevailing market price. By standardising the weigh various market practices and charges, under the provisions c Regulated Markets Act, it should be possible to increase the r of profit of the producers. Early steps in this direction sho taken by the State Governments concerned.

(xiii) *Organise market-news service*

There is need for organising market-news service at least in all the important assembling centres with a view to enable the producers to determine their selling price and derive the maximum benefit.

(xiv) *Organisation for development*

The central and regional committees proposed for the development of the pepper industry should deal also with the various measures which we have recommended above for developing the cardamom industry in India.

CHAPTER III

GINGER (*ADRAK*)

1. General outlook

Ginger of commerce is the dry product prepared from the green underground stems or rhizomes of the plant (*Zingibar officinale*). Although the crop is widely cultivated in the tropical countries, bulk of the annual production in these regions is consumed locally as green ginger itself or in the preserved form and only a small proportion of the crop is converted into the dry ginger of commerce. The most important producers of commercial dry ginger are India, Jamaica and Sierra Leone. China also produces large quantities of ginger, but it is mostly as green rhizomes which are used primarily for consumption in the preserved form. In China, this product is not regarded as a spice nor does it for this reason directly compete with the commercial dry ginger of other countries.

The average annual production of dry ginger in Sierra Leone has been found to vary from 1500 to 2500 tons and the Jamaican crop is estimated at 1000 to 1500 tons. With her production reckoned at 10,000 tons, India is the largest producer and the present supplies from all these sources have been found to vary from 12,500 to 14,000 tons.

The pre-war demand for dry ginger in the world markets was nearly 7,000 tons. As compared to this, the demand during the post-war period has declined by nearly 1,500 tons. The principal sources and the names of the importing countries are given in Table I.

Table I

Distribution of exports of dry ginger from principal sources (in tons)

Importing countries	Export from Jamaica		Export from Sierra Leone		Export from India	
	1938	1948	1938	1948	1938	1948
U. S. A.	400	650	1,100	650	...	..
Canada	150	150	100	..	..	..
U. K.	700	400	750	600	150	50
Australia	50	...	50	..	..	..
Aden	..	..	50	..	1,150	900
Arabia	..	..	..	..	450	500
Others	..	200	650	50	750	600
Total	1,300	1,400	2,700	1,300	2,500	2,050

will be seen that India, Jamaica and Sierra Leone form the source of supply of this spice both before and after the war. e most of the Western countries such as the U.S.A., Canada, and Australia imported ginger from Sierra Leone and Jamaica, African territories, Arabia, Aden and other Middle-East countries rred the Indian product. The preferential demand for the pro- of Jamaica and Sierra Leone is attributed largely to the fact the ginger produced in these regions is cheaper in price by 20) per cent and is of better quality having lesser fibre-content mpared to the Indian product. Unless the intrinsic quality of an ginger is improved by breeding better varieties, and all possi- steps are taken to reduce the cost of production the scope for nsion of our foreign trade in this spice is limited.

2. Position of the industry in India

ome facts regarding cultivation

he most important ginger-growing areas in India are Travan--Cochin and Malabar. The preparation of the dry ginger of nerce is also exclusively confined to these areas. To a smaller nt the crop is grown also in parts of Bengal, the Kumaon valleys ne Uttar Pradesh, Bombay, and Hyderabad. In all these areas, ever, the crop is produced mainly for its green rhizomes and is converted into the dry ginger of commerce. The export trade his commodity thus forms a purely West-Coast industry. In ancore-Cochin, the main producing centres are in the Kottayam sion particularly in the *talukas* of Muvattupuzha, Thodupuzha, kom, Meenachil, Thalapilly and Kunnathunad. Other main lucing areas in the West Coast are in the Malabar district of dras State where the cultivation is concentrated in the Ernad *ka*. In this *taluka*, Cherur and neighbouring villages are typical wing areas and are particularly reputed for ginger cultivation.

Being a rain-fed crop, ginger is grown generally in areas of heavy fall. It requires a rich and well-drained soil for its successful ivation. The soils most suited for the crop are sandy or clayey ns or the typical red loams and laterites of the Malabar coast. plant thrives both at sea-level and at an altitude of 3000 ft. as he Mysore plateau. In the foot-hills of the Himalayas, it is wn to grow at an altitude of 5000 ft. But as in the case of pepper, her very high altitudes nor the coastal regions seem to be favour- for the successful cultivation of the crop. The lower slopes he western ghats appear to be more suitable for better growth yield. Being a tropical plant, it also requires a warm and humid nate and considerable shade.

Though ginger is a perennial plant which lasts in the field for more n a year. It is usually cultivated as an annual crop. The crop es 9 to 10 months for maturity and every year a fresh crop is en. The plant is propagated vegetatively by means of the under- und stems called rhizomes. Ordinarily, only one variety is met h in the different localities but the local varieties are grown year er year.

Before planting, the field is dug-up or ploughed and prepared into g and narrow beds. The beds are heavily manured with cattle- nure and levelled. Seed ginger consisting of small portions

of the underground stems collected from the previous crop is planted in these beds in small pits made at a distance of about 6 inches each way. Planting is done by the end of May or beginning of June before the commencement of the heavy rains the beds are covered with a thick mulch of leaves which serve protect the young shoots from the fury of the monsoon showers also serves as organic matter when decayed. In about 2 to 3 w time the buds shoot up. In July-August, the beds are weeded further manuring is given to the beds. Generally, 2-3 mulch and an earthing-up are given. The plant grows to a height of a two feet and develops several lateral shoots in each clump. underground stems develop and become ready for harvest December-January. As the crop matures, the aerial shoots be to dry up and lodge on the ground. There is also yellowing of leaves. The harvesting is done by digging the whole crop or o portions of the crop according to the needs of the producers for in the markets.

The quantity of seed ginger used is generally one candy of 6 c or 672 lb. but very often even double this seed rate is used. W higher seed rates, the yields obtained have also been found to higher. Under good garden cultivation, the average yield of gre ginger is 8—10 fold of the seed rate. But in certain soils havi alluvial deposits, the yield is reported to be as high as 40 times whi goes to show the immense possibilities of increasing the output this crop by suitable improvements in agricultural practices.

Ginger is an expensive crop. It requires large quantities of se material and intensive applications of manure. The cost of tilla operations, weeding and harvesting are also very heavy. Majori of the cultivated holdings are, therefore, small and are below o acre in size.

(ii) *Preparation of dry ginger for the market*

After digging out, the underground stems are thoroughly washe with water in order to remove the loose soil and dirt sticking to ther These are then kept in the sun for a day or so and then taken to th nearest village markets for sale as green ginger, or *adrak*. It in this form that bulk of the crop is marketed in India. For pu poses of foreign export only dry ginger is used, the preparation which is a local craft so far confined to Malabar and Travancor Cochin. Small quantities of dry commercial ginger are said to b prepared at Keliavasna and Borvia in the Ahmedabad and Kair districts, respectively, of the Bombay State but the total output is no sufficient to meet even the local demand.

Dry ginger is prepared by peeling off the outer skin present in th green rhizomes and drying them in the sun. In order to facilitat peeling, the harvested produce is soaked in water and kept over night. The following morning the produce is rubbed well betwee hands and after cleaning it thoroughly, it is taken out and the outer skin is scraped off with a sharpened bamboo piece and the peeled produce is again soaked in water and cleaned well. After cleaning it is taken out and thoroughly dried in the sun for about a week taking care to turn the whole lot frequently so as to give the produce a uniform drying. On drying, the rhizomes are again rubbed wel

een hands in order to remove any outer skin. The dry ginger uced in this manner is known as the 'rough' or unbleached ginger ommerce. Bulk of the dry ginger produced in Travancore-in consists of this quality only.

nother quality of dry ginger prepared at the West Coast is known leached ginger. For bleaching green ginger is placed in large ow cisterns and water let in until the water level in the cistern is above the produce by about one foot. The entire mass is pled under feet and cleaned thoroughly of the soil and roots the skin is also partly peeled off. The process of soaking under r, trampling and clearing the produce is repeated until the uce is thoroughly clear and also free of its outer skin. The ed ginger is then removed and dipped in a solution containing of lime. It is allowed to remain there for some time and is then ved and dried in the sun. This process of dipping in lime water drying in the sun is continued until the product receives a uni- coating of lime and assumes a bright colour. Dry ginger pre- d in this manner is known as 'limed ginger' or bleached ginger. bleached ginger is in great demand in the countries of the lle-East and also within India while the unbleached product is in demand in the European markets.

When prepared in this manner, the yield of dry ginger, bleached nbleached, obtained from green ginger works out to 20 to 24 cent. Bleaching is also done by fumigating ginger with sulphur, this practice has now been given up since sulphur has become costly and the importing countries have prohibited the presence ulphur dioxide in the commercial samples.

Area and production

egular forecasts of the ginger crop are published in India. rding to these forecasts the acreage and production of the crop e different States during 1951-52 were as shown in Table II.

TABLE II

dia estimate of area and production of dry ginger for 1951-52

State	Area in acres	Production in tons
ncore-Cochin	21,451	7661
s (Malabar & South ara)	13,100	4410
Pradesh	4,000	2960
chal Pradesh	2,014	973
abad	1,804	470
ay	1,210	551
Bengal	1,040	600
e	38	4
	17	6
	1,950	586
Total	46,228	18,221

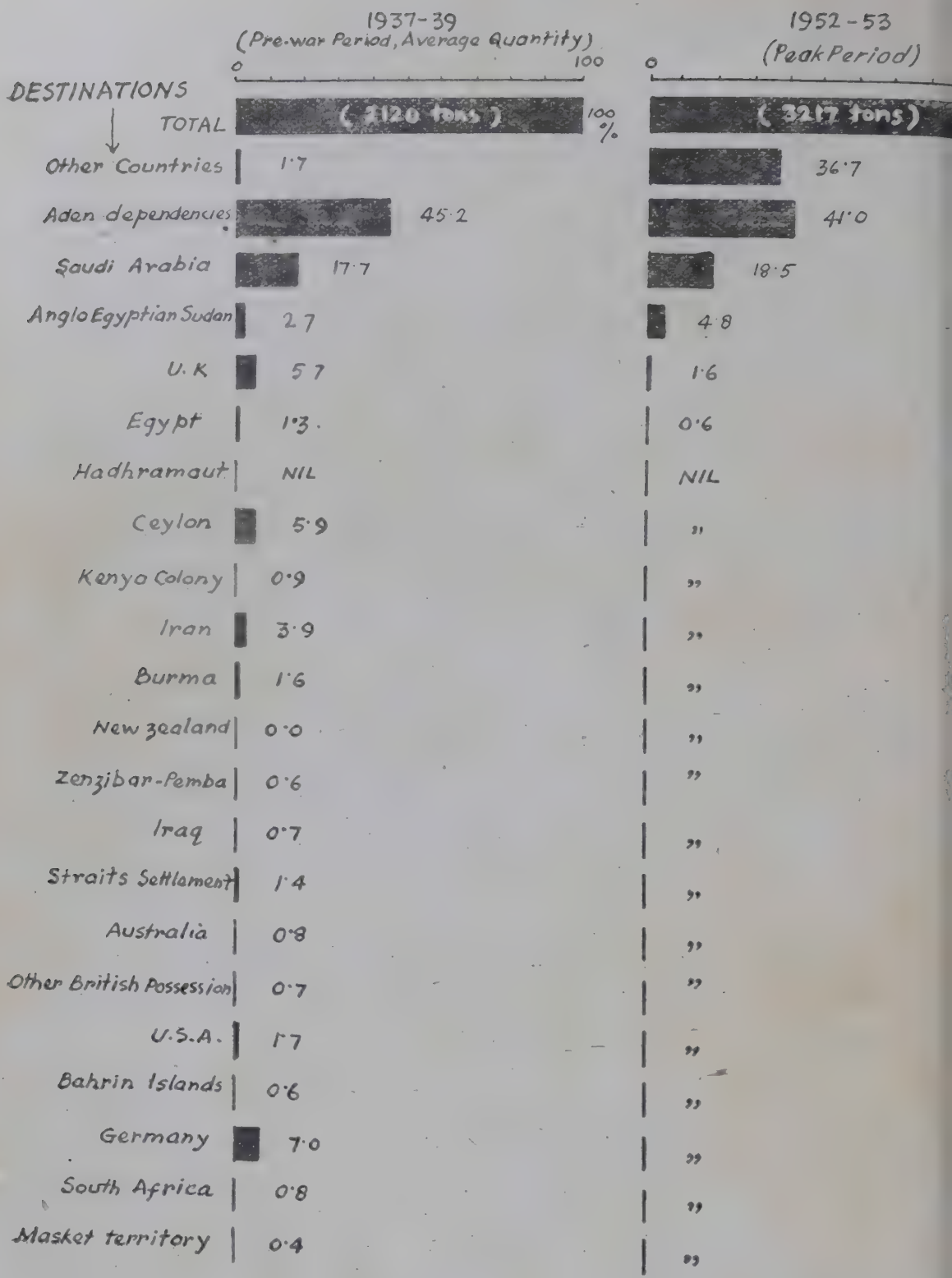


Fig. 18. Percentage export of ginger from India to different countries of the world

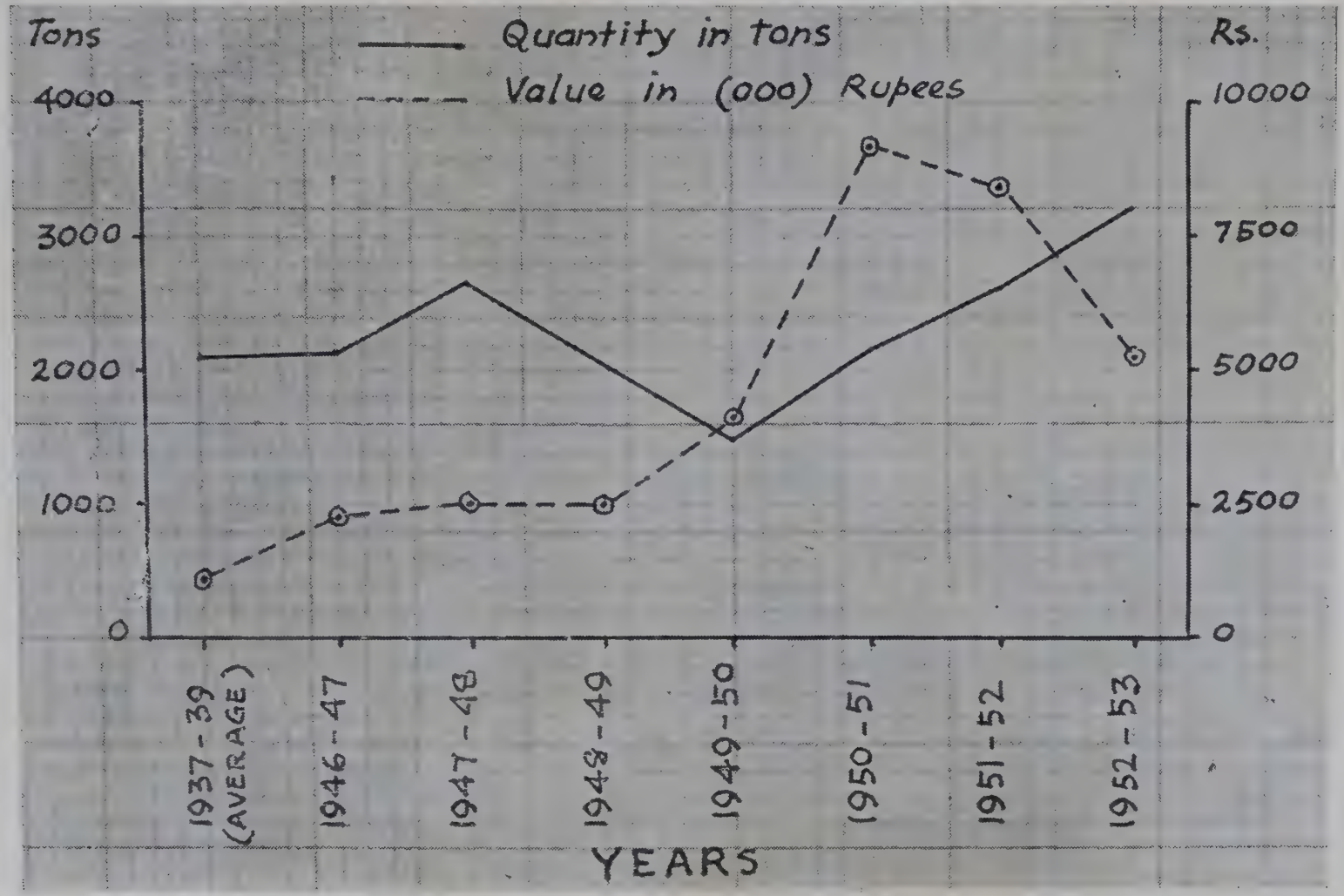


Fig. 19. The trend of exports of ginger from India

The total area under the crop during 1951-52 amounted to 46,228 acres. As much as 46·4 per cent of this acreage was distributed in Travancore-Cochin and 28·3 per cent in the Malabar district of the Madras State. Between these two regions, three-fourth of the acreage under the crop was distributed. Other growing areas are distributed largely in Uttar Pradesh, Himachal Pradesh, Hyderabad, Bombay and West Bengal. The ginger crop grown in Mysore, Coorg and other areas was comparatively much smaller.

The total production from all these areas during 1951-52 has been estimated at 18,221 tons. As already stated, in most of the producing areas the entire crop is used locally as green ginger or *adrak* and the commercial dry ginger is prepared largely at the West Coast in the two regions of Travancore-Cochin and Malabar. These two regions together accounted for a total crop of 12,071 tons. Out of which 20 per cent of the crop is preserved as green ginger for seed purposes and the producers retain another five per cent of the green produce for purposes of medicine, and other domestic uses. The remaining 75 per cent of the West Coast crop amounting to 9,053 tons of dry ginger constitute the marketable surplus available for export and internal distribution.

During 1952-53, the estimated acreage under the crop amounted to 49,458 acres and the total production to 16,615 tons. The supply of commercial dry ginger from the West Coast during the season is estimated at nearly 8,000 tons. The production shows a decline of 1,000 tons as compared to that in the previous year. This is largely due to the unfavourable weather conditions which prevailed during the cropping season particularly in Travancore-Cochin (*vide* appendix XVIII).

Uttar Pradesh grows ginger over a fairly large area and nearly 4,000 acres are put under this crop annually in this State. The total production in this State has been estimated at 14,800 tons of green ginger or 2,960 tons in terms of dry ginger. As this State has not been included in the preparation of all-Indian crop forecasts, arrangements should be made for its inclusion so as to make the forecasts more complete.

As ginger deteriorates in quality on storage, it is marketed immediately after curing and drying. The main marketing season is during the months of January, February and March.

iv) *Export trade*

The annual exports of dry ginger from India to the overseas markets during 1952-53 were the maximum and amounted to 3,217 tons. More than half of the foreign trade is with the countries of the Middle East, the most important being Aden and dependencies which accounted for 41·0 per cent of the total export trade. Both before and after war, this country has been our most important customer. The exports to this country are made through the Bombay port and consist mostly of bleached ginger received from the Malabar coast. Saudi Arabia comes next and accounts for 18·5 per cent of the export trade. Other importing countries are South Africa, Ceylon, Anglo-Egyptian Sudan, Egypt, Iran, the U.K., and the U.S.A. As compared to the quantities exported before the war, the present exports to

Saudi Arabia, Ceylon, Egypt and South Africa show an increase. The exports to the U.K., the U.S.A., Aden and dependencies and Iran have, however, fallen from the pre-war level. The scope for export promotion in these countries should be investigated by the Indian Government Trade Representatives abroad.

The exports of dry ginger to the overseas markets take place through the ports of Bombay and Madras. By far the largest quantity is, however, shipped from the Bombay port.

The pre-war value of exports averaged Rs. 11·4 lakhs which increased during the war to Rs. 21·4 lakhs and has risen up to Rs. 52·1 lakhs at the present time. The increase in total value has been largely due to the post-war rise in the prices of this spice. Since last year the prices have declined so that in spite of the larger quantities exported during the current year the value of the total exports have fallen as compared to that of last year (*vide* appendix XIX).

(v) *Qualities*

The underground stems of dry ginger develop many lateral branches and are shaped like the fingers of a hand when harvested. As there is a special preference for such hands and fingers in the foreign markets, merchants prepare dry ginger in three export qualities, B, C, and D, consisting of three fingers, two fingers and pieces, respectively. In the European markets, B and C qualities are in demand mixed in the proportion of 20:80. The D grade consisting of pieces is exported to other countries and is also utilised for internal consumption.

In internal trade, there are distinct qualities recognised according to the areas of production. The produce of Travancore-Cochin is marketed as Cochin ginger. In Malabar, there are three qualities of which the Chernad quality is considered to be the best. It is reddish-brown in colour, the rhizomes are big in size and comparatively less fibrous. Annually about 500 tons of this quality are produced. The second sort known as Ernad ginger represents the produce of the Ernad *taluka* of the Malabar district. The rhizomes of this quality have no special colour; they are smaller in size and are more fibrous. The third type known as the Wynadan is produced in the uplands of the ghats in the Wynad *taluka* of the Malabar district and this quality is considered inferior mainly on account of its greater fibre-content.

All these clearly show that the trade has clearly distinguished the quality characteristics of different types of ginger produced in the country. But no attempt has so far been made to prepare uniform grades and grade specifications for this produce on an all-India basis. The framing of such grades and grade standards will greatly facilitate the business transactions.

Ginger for export purposes is packed in single new gunny bags. 115 to 160 lb. of the product are filled in each bag. Along with standardisation of the grades, standards for packing should also be prescribed for export purposes.

Fig. 20. Commercial type of dry ginger

Fig. 21. Ginger plant with fully developed rhizome (Malabar district)

ices

The prices of commercial dry ginger have generally improved ring recent years as may be seen from the quotations at Cochin. om a pre-war level of about Rs. 7 per maund the prices of ginger reased to a maximum of Rs. 164 per maund in 1949-50. Since en, ginger prices have declined. The present prices stand at . 57 per maund but are still seven times more than the pre-war el of prices (*vide* appendices XX, XXI and XXII). As compared th other spices and food articles, the increase in the price of ginger s not been abnormal. It has been generally keeping pace with the ward trend in the post-war prices.

Both bleached and unbleached qualities are exported but as these o qualities are prepared for different markets, the prices of these o qualities are not inter-related and appear to be guided entirely the demands of the consuming markets. For instance, in some the pre-war years, it has been noticed that in spite of its higher aching costs, the produce did not receive any premium over the bleached product.

Though actual costs of cultivation are not available, most of the tnesses who gave evidence before us stated that the present prices this product are reasonable and that if this minimum price is sured, production would be maintained. More than any other ctor, stability in the market price of this crop seems to be the termining factor in extending the cultivation and production of is crop.

ii) *Assembling and distribution*

The main assembling markets for dry ginger in Travancore-ochin are Alleppey and Cochin. The arrivals at Alleppey which nount annually to 2,000 tons, are mostly the produce of Palai and mkunnam while the produce arriving at Cochin is mostly obtained om Moovathupuzha, Thodupuzha and other neighbouring areas. the Malabar district the most important assembling market for nmercial dry ginger is Calicut. Almost the entire produce from e *talukas* of Walluvanad, Ernad and Wynad finds its way to the licut market and is distributed from there.

The arrivals in these markets take place mainly during the nths of January to March which is the main marketing season for e crop. As the produce cannot be stored for large periods, it is ported immediately, depending upon the demand and availability shipping space.

Like pepper, ginger is also the most important spice of the West ast. The agencies engaged in the marketing of pepper carry the trade in ginger also. After converting the green ginger into mmercial dry product, the producers themselves carry small lots the interior markets and make outright sale to the village mer-ants who deal in these hill products. When sufficient quantities e purchased by these village merchants dealing in hill produce, ey transport it to the assembling markets at Alleppey or Cochin the case of Travancore-Cochin produce and to Calicut in the case the Malabar produce. At these assembling markets, the produce sold to the commission agents from whom the shippers and porters buy and export.

I. C. of A. R.

Here the commission agents play an important role and ginger trade is mostly in their hands. They store ginger in th godowns for which no godown rent is charged. They also advan money to the village merchants to the extent of 75 per cent of market value of the produce for which 9 to 12 per cent interest charged. In addition they make deductions on account of (i) d count on sale (ii) commission (iii) brokerage (iv) charity and miscellaneous expenses. All these are deducted from the sale p ceeds at the time of final settlement of accounts. These work to nearly 20 per cent of the market value of the produce.

The village merchants thus realise about 80 per cent of the val of the market price. The incidental charges incurred by them transporting the produce from the interior markets to the co mission agents in the assembling market are generally borne by t village merchants themselves. But they indirectly realise th amount in many cases from the primary producers by manipulati the weights, etc. The merchants make also unauthorised deductio on account of dust and other refraction to the extent of 4 to 6 p cent of the weight of the produce. Even if cleaner produce marketed such deductions are made and the producers, therefor often lose the incentive for selling better quality produce. Thes defects can be remedied only by organising regulated markets f this product in import centres.

The produce changes hands at least three or four times and wit each change the margin of the producer is reduced. The num ber of links in the chain could be reduced if the sale is attempte by the producers themselves on a co-operative basis. The satis factory working of the District Produce Sale Society of Malabar a Calicut and Vengara indicate that there is great scope for employin the co-operative method for the sale of this and other hill produce o the West Coast. The authorities of this society particularly a Vengara, the main primary market for Ernad ginger, stated that th godown space provided was not adequate and if larger godown could be constructed they could increase their turnover. Al facilities should be given by the Centre and the respective States t provide adequate godown space to such primary co-operative societie and thus encourage co-operative marketing of this product.

3. Research, technology and development

(i) *Regional research stations*

From the point of view of international trade, the more urgen need of the ginger industry in India is to improve the quality of th local produce by evolving a fibre-free product by introduction, cross breeding, and/or selection. The Jamaica and Sierra Leone products are superior to the Indian product in this respect and we cannot com pete with these countries until we improve the quality of our pro duct. No scientific research has so far been carried out to achieve this object. We should also step up our yield per acre and thus bring down the production costs so as to offer competitive prices for our products. As all these involve both fundamental and systematic research, there is need for opening research stations in all important producing areas.

Supply of seed rhizome

Generally, cultivators retain adequate quantities from their pre-
us crop for purposes of seed. Very often these are found to be
eased and the cultivators experience considerable difficulty in
ting reliable planting material. We, therefore, suggest that
angements should be made to establish a large number of seed
ltiplication farms and for supply of quality seed material.

) *Better methods of storage*

The quality of ginger stored in gunny bags deteriorates in 5 to 6
nths. Research should be conducted to improve the keeping
ality of this product by improving the methods of storage. Various
thods of preparing commercial dry ginger also require careful
estigation and study.

) *Pests and diseases*

There are no serious pests attacking the ginger crop but the 'soft-
' sometimes causes considerable loss. The affected plants become
le and the tips turn yellow followed by the wilting and drying
the leaves. The shoots and rhizomes are also gradually affected
d further production of rhizomes is stopped. This disease is pre-
lent in damp and badly drained soils and the loss is heavy in places
heavy rainfall. The soil and seed are both affected and being a
getatively propagated crop they carry the infection from one crop
the next. The damage is caused mostly by an organism belonging
the Pythium species. The remedy advocated by the Agricultural
partment against this disease is the use of 0·05 per cent mercuric
loride for treating the rhizomes before storing as seed as well as at
e time of planting. Apart from being a poisonous chemical which
not safe to handle, the remedy has not been reported to be fully
ective. Experiments with colloidal copper and chestnut-compound
pear to give more promising results. Another disease noted on
ger is known as 'varmicularia' where the leaf blades become cover-
with yellowish and brownish spots and gradually dry up. Spray-
with Bordeaux mixture is indicated in such cases.

Among the pests, mention may be made of the turmeric shoot
er. Suitable remedial measures for combating this pest should
found out.

Technology

In the foreign countries, large quantities of ginger are utilised
the extraction of ginger essence and oil. As great demand exists
such products in India itself, facilities should be given to set up
h industries in the country and encourage the export of these
nufactured products to the overseas markets.

4. Summary of conclusions and recommendations

General outlook

As compared to the commercial qualities of dry ginger exported
m Jamaica and Sierra Leone, the Indian product is more fibrous
l is considered to be of inferior quality. The prices of the Indian

ginger are also 20 to 30 per cent more than those of the two fore qualities. Nearly two-thirds of the world demand is met by supp from the former two countries and the rest is contributed by In Further expansion of India's foreign trade in this spice depe largely upon the improvement in the intrinsic quality and costs Indian ginger.

(ii) *Need for starting new research stations*

Although some of the diseases of the crop have received attenti in some of the States, no botanical improvement has so far be undertaken particularly with a view to improving the local types ginger. We recommend that regional research stations should opened in typical ginger-producing areas for evolving a better ty of ginger having less fibre-content and finding out other improv agronomic practices.

(iii) *Credit facilities during cultivation season*

Ginger is an expensive crop to grow and although the cultivat are greatly in need of financial assistance during the cultivati season, adequate credit facilities are not available. It is, therefor recommended that the Governments of the States concerned and th Central Government should assist in removing all credit restrictio in the working of cooperative societies and make available adequa production credit. There is considerable scope for expanding produ tion if such seasonal credit facilities are provided.

(iv) *Crop estimates*

The forecasts of area and yield of the ginger crop do not inclu the figures for States like Uttar Pradesh where nearly 14,800 to of green ginger equivalent to 2,960 tons of dry ginger are produce in nearly 4,000 acres. These and other producing States should b brought under the reporting regions and the forecasts made mo comprehensive. It should, however, be stated in the forecast tha bulk of the local production is consumed as green ginger in mo of the producing areas, and the conversion of green ginger into th dry form for export purposes is concentrated in the West Coa regions of Travancore-Cochin and Malabar.

(v) *Uniformity in grade standards*

Dry ginger is exported both in bleached and unbleached form To obtain price quotations on a comparable basis and create bett confidence in the foreign buyers, it is necessary to frame suitab grade standards for this product on an all-India basis. Early ste in this direction should be taken under the Agricultural Produc (Grading and Marking) Act. These standards of quality should the be included in the trade contract terms which should provide als facilities for arbitration in India in case of disputes between th parties.

(vi) *Trend of foreign exports*

Although the post-war exports showed an increase over the pr war period, recent exports have shown a decline particularly to th U.S.A., the U.K., Aden and dependencies and Iran. The causes of thi

line and the scope for export promotion in these countries should investigated by the Government of India Trade Representatives oad.

) *Co-operative marketing*

The cooperative agency plays a very insignificant part in the keting of dry ginger. The main difficulty that stood in the way he development of some of these societies did not provide for quate storage facilities. Necessary financial assistance should be en by the Central and State Governments to these cooperatives the construction of warehouses in all important marketing centres.

) *Regulation of markets*

As in the case of other agricultural commodities, there is no uni-nity in the system of levying market charges in the case of ginger . Standard weights are not also always used. The producers' re of the prevailing prices could be increased by extending the ration of the Regulated Markets Act to this article also in all portant markets in the West Coast.

Fumigation at the ports

In order to reduce insect infestation in the products exported n India, arrangements should be made for their proper storage fumigation at the ports of shipments.

Market-news service

The producers in most of the ginger-producing areas are unable obtain the maximum prices for their produce as they are not are of the prevailing conditions in other markets. It is, therefore, essary to organise a market-news service and disseminate up-to- information regularly by means of radio-broadcasts, bulletins,

Organisation for development

The central and regional committees proposed for the develop-t of pepper should deal also with the various measures which have recommended above for developing the ginger industry in a.

CHAPTER IV

TURMERIC (*HALDI*)

1. General outlook

Like ginger and cardamom, turmeric is also grown only in the ɔpical countries. Its cultivation extends from India to Indo-China, ıst Indies and part of China. But excepting India very little infor- ation is available about the production and trade of this commodity other parts of the world.

2. Position of the industry in India

Some facts regarding cultivation

Turmeric known as *haldi* in Hindi and *manjal* in Tamil and Mala- lam, is used as an important condiment almost in every Indian home .d has been under cultivation in India from very ancient times. The op grows from sea-level to an altitude of 4,000 ft. In higher alti- .des, it is met with in the wild form both along the eastern and estern ghats. The soils most suited for turmeric cultivation are ndy and clayey loams. The crop requires proper tillage and .reful cultivation. It cannot stand water-logging or alkalinity in e soils. It is grown both under irrigation and as an unirrigated op. On the West Coast, turmeric is cultivated solely with the help the monsoon rains.

Varieties. There are no sharply distinguished varieties under ltivation but some types grown in certain localities are reputed for .eir colour. The Malabar variety is reputed to have better medici- ıl properties particularly for cold and catarrh while the types grown :ar Poona and Bangalore are specially esteemed for the depth of the lour. The wild turmeric is distinguished from the cultivated .rieties as *Curcuma aromatica* because of the considerable fragrance ıitted by some of these stems. *Curcuma amada* is another type of 'meric grown in many parts of the east coast where it is known by ; name of *mango-ginger.* Its resemblance in taste and smell to :en mangoes when tender has probably given rise to this local me. The rhizomes of this variety of turmeric are much thinner ın other varieties and are whitish in colour instead of being .lowish as other varieties. The most popular variety cultivated ' commercial purposes is however *Curcuma longa.*

Cultivation. The crop is propagated vegetatively by means of swollen under-ground stems known as corms. The crop requires ine tilth and heavy application of manure. The preparatory culti- tion consists of ploughing the field six times, breaking the clods .d removal of stubbles, roots and weeds from the surface of the ld. Cattle manure is then applied at the rate of about 40 cart- ıds per acre and the field prepared into narrow beds with facilities ; irrigation and drainage. During April to July turmeric corms nderground stems) are planted in these beds 6 to 9 in. apart in ; furrows and 16 in. apart between the furrows. After planting :d material, the beds are levelled and a thick mulch of leaves is ɔlied on it. Quick-growing vegetables and root-crops like Colo- ;ia and yam are also sometimes planted in between the beds. e corms send forth aerial shoots above the ground in about a

month's time and make rapid growth. One or two hoeings a weedings are given and the beds are earthed-up along with t harvesting of the minor vegetables and root crops at the close of t south-west monsoon. By November, the leafy growth of the turme crop is fairly complete and the corms below begin to thicken a develop uniformly deep colour. About February the leaves begin turn yellow and dry up one by one which is an indication of t maturity of the under-ground stems or corms. Harvesting commenc in March and continues till the end of April.

Harvest. Harvesting of turmeric has to be done with great ca The whole clump has to be lifted up without injuring the cor which consists of both primary and secondary branches known 'fingers' as well as the main thickened portion known as the 'bul The leaves and roots are then cut off and the bulb and finge separated from each other. Very small quantities are marketed this raw form but bulk of the turmeric crop in India is market as dry cured turmeric.

The quantity of seed turmeric used for planting purposes vari from 750 to 1500 lb. per acre and the average yield of green turmer is generally 8 to 10 fold. Much heavier yields are however obtain under more intensive methods of cultivation.

(ii) *Preparation of commercial turmeric*

The green turmeric has to be cured properly before the commer cial product can be obtained. Curing consists mainly of boiling an drying the harvested produce and giving it a polish for improving it appearance.

After harvest, the raw green turmeric is heaped up and covere over with turmeric leaves and kept in this condition for some time The entire produce is then transferred to an earthen pot or larg iron pan and the vessel is filled with water, the water level standing 2-3 inches above the level of the turmeric. After covering with dry turmeric leaves, the vessel is boiled under direct fire. When the rhizomes turn soft to touch, these are removed from the pan and thinly spread out and dried in the sun. After 5—7 days of drying the produce becomes fit enough for storage and sale. After it is quit dry, it is cleaned to remove roots and other parts and then rubbed well between hands. It is also polished by means of special appli ances. The produce is then sorted out into fingers, bulbs and splits and also graded into large and small sizes according to the require ments of particular markets.

The recovery of cured commercial turmeric from the raw green turmeric varies from 15 to 25 per cent.

(iii) *Area and production*

Unlike the cash crops included in the terms of our reference turmeric has no special importance in the agricultural economy of the West Coast. The acreage and production of this crop are small in these regions and the trade in this product is also relatively insignificant.

The principal turmeric-growing areas in India are the East Coast distributed mainly in the two States of Andhra and Orissa. To a smaller extent, the crop is grown also in parts of Bombay and Hyderabad. In the Andhra State, turmeric-growing is concentrated

Fig. 22, *Curcuma longa* (turmeric) plant and rhizomes

Fig. 23. Curcuma Lomestica (*Courtesy* C.S.I.R.)

ıe Guntur district particularly at Duggirala. By far the largest unt of the commercial supplies are obtained from this source. r areas of large-scale turmeric cultivation in the State are the icts of Cuddappah, Kistna, West and East Godavary, while chirapally, Salem and Coimbatore districts of Madras are also ɔrtant for this crop. The production in the west coast region is ;nificant. (*vide* appendix XXIII).

)rissa is the next important growing-area for turmeric in India, centres of concentrated production in this State being the dis- s of Ganjam, Phulbani and Koraput. In Bombay, the main res of turmeric production are in Gujerat, Thana and Khandesh icts. The Sangli and Kolhapur areas also produce sizable quan- s of the crop.

Among the other States which are important for this crop, may nentioned Uttar Pradesh, Madhya Pradesh, Mysore, West Bengal, dhya Pradesh, Rajasthan and Punjab.

Regular forecasts of the turmeric crop in India are not published. from the information obtained from official sources, the area er and the production of turmeric crop in the different States ndia have been estimated as shown in Table I.

TABLE I

Area and production of turmeric in different States of India

State	Area in acres			Production in tons		
	1949-50	1950-51	1951-52	1949-50	1950-51	1951-52
bay	10,212	10,212	10,212	8,800	8,800	8,800
hya Pradesh	2,151	2,372	2,518	1,306	1,468	1,564
ras	54,125	53,685	53,685	69,800	72,300	72,300
sa	35,530	37,567	43,549	25,725	26,552	29,359
ab	126	126	126	58	58	58
t Bengal	600	600	600	331	331	331
lerabad	12,698	15,884	12,224	5,669	7,092	5,466
ɔore	374	417	379	83	94	87
asthan	85	128	133	64	82	93
ıspur	48	57	44	1	1	1
dhya Pradesh	180	180	224	118	118	124
r Pradesh	3,000	3,000	3,000	3,300	3,300	3,300
vancore-ochin	12,000	12,000	12,000	900	900	200
al	131,129	136,228	138,739	116,155	120,088	122,383

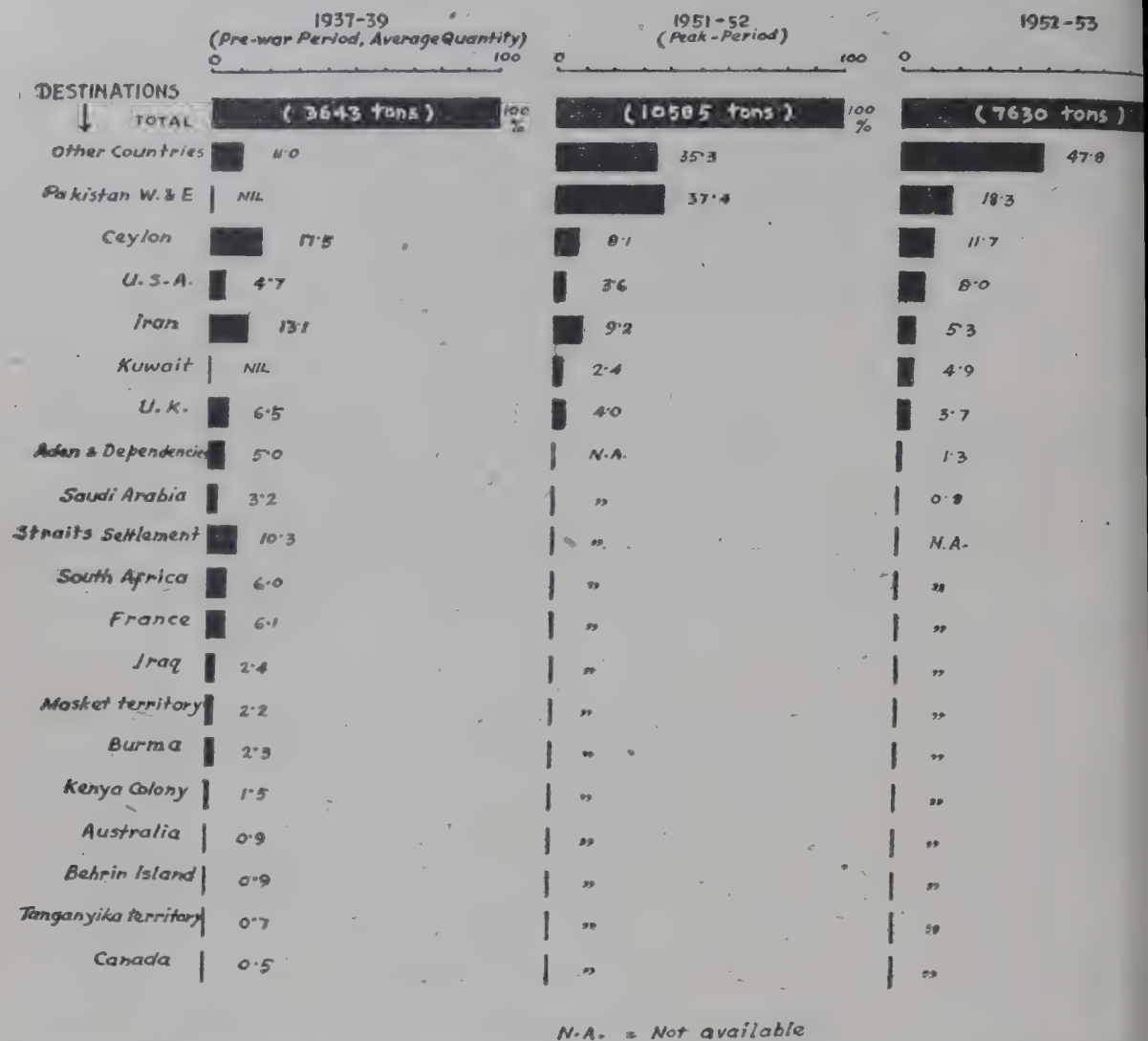


Fig. 24. Percentage export of turmeric from India to different countries of the world.

On an average, turmeric crop covered an area of 1,35,365 acres ıring the triennium ending 1951-52, and total production of dry ıred turmeric from those sown area has been estimated at 1,19,542 ons which works out to an average yield of 1,978 lb. or nearly one n per acre.

The average yield has been found to vary from 2,500 to 4,000 lb. Salem, Tiruchirapalli and Tanjore while in Guntur and Kistna, ıe yield is as high as 5,000 lb. of cured product. In Orissa, the verage yield in the main producing area of Ganjam is estimated 2,500 lb. while in other districts only one-third of this quantity obtained. Such wide variation in the yield of this crop is due to fferences in cultural practices. But this clearly indicates that with roper care and attention, there is ample scope for increasing the ield of this crop.

The acreage and production of turmeric have shown an upward rend in recent years. The total acreage under the crop increased from 1,31,129 acres in 1949-50 to 1,38,739 acres in 1951-52 representing a rise of nearly eight per cent. During the same period, he total production rose from 1,16,155 tons to 1,22,383 tons representing an increase of nearly six per cent. The increase in rea has largely occurred in the Orissa State, particularly in the gency tracts. In Madras, the acreage under the crop has remained ıore or less the same but higher prices prevailing during this period ıave stimulated intensive cultivation of the crop and have resulted ı larger out-turn during the period.

The crop is harvested in the months of February to April. Immeiately, thereafter, the curing operations commence and the marketng of the produce also begins. As already stated, the produce is lassified by the trade into two main qualities, namely, 'bulbs' and fingers'. It has been estimated that nearly 75 per cent of the production in Orissa State and 20 per cent of the crop in the Madras State consists of 'finger'-turmeric while the remaining quantities in ıese States are marketed as 'bulb'-turmeric. The 'finger'-turmeric s considered to be of better quality and fetches a premium.

iv) *Export trade*

There are no imports of turmeric into India from any other country. India exports annually to many overseas markets. While the verage annual production amounted to 1,19,542 tons, the exports f cured turmeric from India to the foreign markets during 1951-52 mounted to hardly 10,585 tons representing only eight per cent of he total crop. The rest of the crop amounting to nearly 92 per ent of the annual production is retained as seed and for domestic consumption and distributed in internal trade which has, therefore, assumed great importance in the case of this crop.

Turmeric trade has been depressed since long and this industry does not seem to have seen bright weather for many seasons past. But since world war II, there has been an improvement in the situaion both in the quantities exported and in prices. During the prevar period, the average annual exports of dry cured turmeric were of the order of 4,000 tons only. There was a slight increase in this quantity during war but has more than doubled itself at the present ime (*vide* appendix XXIV). The exports during 1951-52 amounted to 10,585 tons. The foreign exports take place mainly through the

Bombay port and are largely controlled by the members of the Kira Merchants Association and their brokers in the Mudi Bazaar.

The principal importers of Indian turmeric are Ceylon, Sou Africa, Iran, Aden and dependencies, the U.S.A. and the U.K. T off-take of Ceylon was 639 tons before the war but has increas to 800 tons at the present time representing an increase of nea 25 per cent. Iran is the next important customer. This coun imported 478 tons of turmeric from India before the war but h post-war exports have increased to 657 tons representing an increa of 37 per cent. The exports to Aden and dependencies have creased from 182 tons before the war to 417 tons at the present ti representing an increase of 129 per cent. Similar upward trend h been noticed in the exports to the U.S.A. also. The pre-war Americ demand amounted to hardly 172 tons which has increased to 560 to representing an increase of nearly 225 per cent. Canada is compa tively a new comer. Before the war, the share of this country the Indian exports amounted to hardly 19 tons but has increased the present time by nearly five times. The demand from the U. has been more or less steady both before and after the war. Besid these countries, Indian turmeric is at present exported to ma other destinations also. Although the off-take of these individu countries is small, these changes in the direction of trade are i portant and indicate the scope for expanding our world trade this commodity. Although the exports have increased in recent yea these form less than 10 per cent of the annual crop produced India and the remaining quantities are all utilised for internal di tribution.

There is no definite periodicity in the case of turmeric export The quantities exported have been more or less uniform in differe months of the year.

There are two qualities of turmeric which are used in the foreig export trade, *viz.* 'fingers' and 'bulbs'. The European markets pref the 'fingers' while the 'bulbs' are exported mostly to the countri of the Middle-East. Besides fingers and bulbs, a third quality also prepared and is known as the 'splits' or mixed. But this qualit is mostly used for internal distribution. The growers do not unde take any grading work. They merely sort out the produce int fingers and bulbs and it is the merchants who prepare a uniform pr duce for export purposes. The merchants prepare the stuff accor ing to the purpose for which it is to be used. The chief factors good quality in turmeric are a deep yellow colour, hardness, metalli sound, aroma and pungency.

In spite of the well-defined quality characteristics which exist f turmeric such as colour, hardness, metallic sound, aroma and pu gency, there are no standard grades and grade specifications for th product. The contract terms adopted by the trade are also not un form and are based on the terms prescribed by the American Spic Trade Association of New York or the Produce Brokers Associatio of London. Exports take place in gunny bags which appears t serve the purpose well. The capacity of these bags is generally 1 lb. But with greater uniformity in grades and grade standards an in the packing adopted for export purposes better confidence wi be created in the foreign markets.

) *Value of exports*

Like the quantities exported the value of exports has also steadily creased since world war II. The pre-war value of exports varied om Rs. 10 to 19 lakhs which increased to Rs. 32—35 lakhs immeately after the war. It has increased further subsequently and ring the last few years, the total value of turmeric exports from dia has amounted to over one crore of rupees annually as may be en from the following:

Value of turmeric exports

1949-50	Rs. 1·10 crore	
1950-51	„ 1·25	„
1951-52	„ 1·00	„

The maximum value which was realised during 1950-51 amounted to Rs. 1·25 crores. With the growing demand for this product in e world markets, there is scope for enhancing the quantity and lue of these exports. One of the urgent steps that should be taken this connection is to give better publicity to these products in e foreign markets and to ensure the quality of our foreign exports.

i) *Internal trade*

Unlike other spices and condiments, only a small proportion of e annual turmeric crop is exported from India to the foreign counies. The quantity exported amounts to hardly less than 10 per nt of the total crop produced in India. Bulk of the remaining pply is all utilised within the country and distributed in the north dian markets. *Haldi* (turmeric) is an indispensable item in every dian home. With the growth of population, the demand for this idiment has also grown.

Out of an annual production of 1,19,542 tons, 20 to 25 per cent are ained by the producers as raw turmeric for seed and domestic nsumption and only the balance amounting to 90,000 tons is ailable as marketable surplus. Leaving 10,585 tons or nearly ,000 tons which are exported to the foreign countries, the remaing 79,000 tons are utilised for distribution within the country. The antity used in internal trade is by far the largest and amounts nearly seven times more than what is exported outside the untry. The produce moves from the producing areas in Andhra, adras and Orissa States to the distributing markets at Nagpur, mbay, Calcutta, Kanpur, Delhi, Amritsar and Shalimar. Besides ese inter-State movement considerable quantities enter local trade, ithin the States.

By far the largest quantity entering internal trade, is transported rail. Nearly three-fourth of the despatches from Madras and most the entire quantity from Orissa are moved by means of this nsport. The arrivals into Bengal and Bombay are by means of astal steamers.

(vii) *Uses*

Turmeric is used in various forms in India. It contains a yell dye 'Curcumin' which is used for colouring textiles like cotton, w and silk. Old turmeric is preferred for this purposes as it give deep and fast colour. It is also used in small quantities by rice-milling industry in order to disguise the spots on the rice grai Its use as a colouring material has been reported in the paints a varnishes industry also. With the availability of cheaper, synthe dye-stuffs, the demand from these sources has lessened.

Turmeric is also used in preparing medicinal oils, ointments a as a preservative. The burnt fumes of certain varieties of turme particulary the 'fingers' of the West Coast are said to be a speci remedy for relieving the common cold and catarrh. Both raw a cured turmeric are used against skin diseases and itches. It is al one of the principal cosmetics used by Indian women from ancie times and is an auspicious symbol in many ceremonies.

By far the largest quantity of turmeric is, however, utilised a condiment. It is used in this form daily in almost all household in India particularly in many vegetable meat and fish preparation Turmeric is an important ingredient of all curry powders which a exported to the foreign countries. With the growing demand f curry powder in the foreign markets, the demand for turmeric is al likely to go up.

(viii) *Prices*

Bombay and Calcutta are the two important markets for turmeri in India. The average annual prices prevailing at these two marke give a correct indication of the trend of prices of the product (Tabl II).

TABLE II

Average annual prices of cured turmeric in some important India markets (rupees per maund)

Year	Bombay			Calcutta		
	Rs.		As.	Rs.		As.
1939	11	—	10	12	—	10
1940	9	—	11	11	—	3
1941	8	—	2	8	—	3
1942	10	—	11	9	—	8
1943	18	—	9	16	—	3
1944	15	—	7	15	—	3
1945	15	—	15	17	—	5
1946	29	—	2	26	—	8
1947	40	—	13	38	—	0
1948	45	—	3	44	—	14
1949	45	—	13	47	—	15
1950	46	—	6	49	—	1
1951	28	—	0	23	—	0
1952	28	—	0	22	—	0
1953	28	—	0	22		0

As compared to the pre-war figures, the prices of turmeric have generally improved during the post-war period. This general improvement in the price level is noticed both at Calcutta and at Bombay which are the most important distributing markets for this product in India. From the low level of Rs. 8 to Rs. 12 per standard maund prevailing for the produce at the commencement of the world war II, the prices steadily increased and touched nearly Rs. 30 towards the close of the war-period. In subsequent years, the prices further increased and stood at Rs. 46 to Rs. 50 representing an increase of nearly five times over the pre-war level. This maximum rise was noticed during the year 1947—1950 (*vide* appendices XXV—XXVIII).

Since 1950, the prices of turmeric have declined and in 1952-53 seem to have stabilised at Rs. 22 at Calcutta and Rs. 28 at Bombay. The present depression has been brought about partly by the larger supplies received during this period and partly also due to the weak demand from the foreign markets. As compared to the 1947—50 figures, these price levels are low but are not lower than the pre-war level of prices. The prices are still nearly 2 to 3 times more than the pre-war price levels which condition is nearly in keeping with the general rise in the post-war prices. In recent months, the prices have shown some recovery. As there is a steady demand for turmeric in India, there is no marked seasonal variation in the price of this product. From April to October, however, the prices of turmeric remain below normal in some years due mostly to the larger supplies available during this season. From November onwards, the prices show an increase and continue the upward trend up to March. This seasonal variation is attributed to the reduced stocks and larger foreign exports during this period.

(ix) *Assembling and distribution*

The important assembling markets for turmeric are in Andhra, Madras and Orissa States which are the principal sources of supply of this commodity. In Andhra the most important assembling centre is Duggirala while Madras, Erode, Salem and Cochin are the main centres in Madras State. In Orissa, the main assembling markets are Berhampur and Parlakimedi in the Ganjam district and Jeypore and Nawrangpur in the Koraput district. The Bombay produce is assembled mostly at Sangli and in smaller quantities at Tasgaon, Kolhapur, Takari and Karad.

As already stated the main distributing markets in India are Madras, Bombay, Berhampur, Nagpur, Delhi, Kanpur, Amritsar and Shalimar.

Turmeric is marketed in three different ways. These are (1) direct sale by the growers, (2) sale by commission agents and (3) sale by village merchants to wholesalers. Generally, however, the trade is in the hands of the commission agents. Often the growers go to the commission agents and seek their aid. The buyers also go to these commission agents and make use of their services. The commission agents arrange for conducting auctions, supervise weighing, etc., settle the amount due and complete the transactions and charge a commission from both the parties at the rate of one to two per cent of the value. In most of the transactions, the produce

was found to change hands 3 to 5 times and the grower has h found to realise 54 to 80 per cent of the prevailing market pr The majority of the producers being poor they take loans from village merchants and commission agents and are indebted to th Under these circumstances, the bargaining power and the ma of profit of the producers are curtailed.

The role of the co-operative agencies in the marketing of turm is almost negligible. This situation is exploited both by the vil merchants and by the commission agents to whom the producers their produce at a price generally fixed by them. The absence standard weights and specified market charges give further sc for manipulation of these agencies and reduce the returns of producers.

3. Research, Technology and Development

(i) *Opening new research stations*

Although Madras so far constituted the most important sou of supply of turmeric in India, very little attention has been p for the scientific development of this crop. The *tenali* or *duggirala type* of turmeric grown in this region is reputed for better qualities. No systematic attempt has, however, been ma to study this crop in its native habitat or to propagate it in systematic manner. There are also many cultural and manur problems which have to be tackled. To add to these, the turme crop in these tracts is prone to the attack of pests and diseas which are locally known in Telegu as *lambodi tegulu, pogachu tegulu,* and *tateku tegulu.* No regular attempt has been made find out suitable remedial measure for these diseases and pests to supply disease-free seeds for planting purposes. All these requi systematic investigation at a regional research station.

Arrangements should also be made at this station for t multiplication and distribution of good type of seed-turmeric to t cultivators and to find out suitable methods for the preservation the seed material.

The Turmeric Research Station started at G. Udayagiri in t Orissa State under the auspices of the Indian Council of Agricultur Research, has carried out investigations on many local problems Orissa. Some of the results obtained at this Station could be us with advantage in other areas also.

(ii) *Improved type of furnace for curing*

The experiments conducted at the Turmeric Research Statio Orissa have shown that in the local type of furnace used for curi turmeric, nearly 65 maunds of fuel are necessary for curing 1 maunds of raw turmeric and that in a day of eight hours near three maunds of raw turmeric could be cured. The improve local type evolved at the station used only 50 maunds of fuel f the same quantity. The quantity of raw turmeric that can be cure per day of eight hours amounted to nine maunds and was thre times greater. Nearly 30 per cent economy in fuel consumptio can be effected by the adoption of the improved type of furnace. mechanical appliance devised at this Station for polishing turmer has also proved very useful.

(ii) *Regulating quality of exports*

There are frequent complaints in the foreign markets regarding ;e quality of turmeric exported from India. It is stated that the ndian product is weevil-infested and that it is often contaminated ;ith the excreta of rodents, etc. Such complaints do great damage) the reputation of the Indian produce in addition to the financial)ss caused to the exporters by way of reconditioning, cleaning, etc. .; the destinations. It is, therefore, of importance to regulate the uality of exports by fixing suitable grades and grade specifications.

It is reported that considerable quantities of turmeric powder nter the internal trade. The produce available for internal con-umption is, however, of uncertain quality and is often found adulte-ated with ingredients which are dangerous to health. There is, herefore, scope for developing the internal sale of quality turmeric)owder in suitable containers.

4. Summary of conclusions and recommendations

(i) *General*

Turmeric is a minor crop of the West Coast which has no special mportance in the agricultural economy of the tract. During its ;tudy tour of these regions, the Spices Enquiry Committee did not, herefore, get adequate evidence concerning the problems of this industry. Nor has the committee visited the East Coast districts of Madras, the agency tracts of Orissa and certain parts of Bombay and Hyderabad which are the principal producing areas of this crop. The present report is, therefore, based on a rapid study tour of only ;ome of the minor producing areas and on the limited information ;upplied by official agencies. Available information shows that although turmeric is a minor West Coast crop, this industry has ;ufficient importance in other parts of the country and in internal rade. A detailed marketing survey should, therefore, be conducted y the Central Government in order to assess all the problems con-erning this industry. We are also convinced that the development f this industry should be separately planned and executed and hould not be brought within the present scope of the central and egional advisory committees we have recommended for the other ive commodities.

We are, however, giving below a few of the outstanding prob-ems of this industry as have come to our notice and our recom-nendations thereon.

(ii) *Need for all-India crop estimates*

The average annual acreage under the turmeric in India has been estimated at 1,35,000 acres and the total out-turn of the crop has been reckoned at 1,20,000 tons expressed in terms of dry cured pro-duct. Excepting about 10,000 tons exported to the overseas markets, he rest of the crop is almost entirely utilised in India. Reliable ;tatistics of production and internal consumption are not, however, available. Considering the importance of this product in internal rade we recommend that the Central Government should arrange o publish regularly all-India forecasts of area and yield of turmeric.

(iii) *More research stations*

Except in Orissa, no systematic attempt has been made to deve the industry on scientific lines. There is urgent need for improv the local varieties under cultivation and for finding out suita remedies for seed diseases which are carried from season to seas Arrangements should therefore be made to start turmeric resea stations in all other typical producing areas. These stations shou tackle all the problems of botanical and agronomic improveme concerning this crop including problems of storage and control stored products pests.

(iv) *Credit facilities*

Like ginger, turmeric is also an expensive crop to grow a requires financial assistance during the cultivation season. Great production credit should therefore be made available to the cul vators through the co-operative agencies.

(v) *Transport*

In common with all other agricultural commodities, the marketin of this crop also suffers because of lack of suitable communication particularly in the agency tracts of Orissa. Improvements in th direction are, therefore, necessary to open up the producing area

(vi) *Better equipment for curing and polishing*

The improved type of furnace evolved at Orissa has been foun to be more efficient and economical in fuel consumption than th local type. The cured product when also polished by the equipmen evolved in this State has fetched a premium of 20 per cent. Greate use of these and similar equipments should be encouraged by th agricultural departments of the States concerned.

(vii) *Foreign publicity*

The principal importers of Indian turmeric are Ceylon, Soutl Africa, Iran, Aden and dependencies, the U.S.A. and U.K. Beside these many other countries also import turmeric from India thoug in small quantities. In all trade exhibitions organised by the Gov ernment of India in foreign countries, greater publicity should b given to this product in order to increase the off-take.

(viii) *Uniformity in grade standards*

Turmeric has well-defined quality factors which are also recog nised by the trade. These factors should be taken advantage o for framing uniform grades and grade standards under the Agricul tural Produce (Grading and Marking) Act.

A sizable proportion of the turmeric trade takes place in the form of powder. As there are serious complaints regarding its quality, grades and grade specifications for this product also should be framed and effort should be made to induce the trade to adopt these standards for internal distribution.

CHAPTER V

CASHEWNUT (*KAJU*)

1. General outlook

Although the cashew tree, (*Anacardium occidentale*), is met with in many tropical and sub-tropical parts of the world the seeds of the tree known as the cashewnuts are collected on a commercial scale only in India, East Africa and Brazil. The Brazilian crop is comparatively smaller and by far the largest quantities of cashewnut are produced in India and East Africa. The entire East African crop is, however, exported as raw nuts to India and the processing and manufacture of cashew kernels are almost entirely carried out in India. India is thus the principal source of supply of cashew kernels and bulk of the requirements of the world markets are also met from this source. Over 90 per cent of the world demand is estimated to be met with by the Indian industry and the small balance is contributed by other countries mostly Brazil.

With the growing demand for cashew kernels in the world markets, there is an increasing realisation of the commercial importance of this industry. The increasing popularity of this product may be noticed from the quantities consumed in various countries during the last quarter of a century. The increased consumption has been noticed particularly in the U.S.A. where the quantities annually consumed have increased from less than 50 tons in 1925 to as much as 20,000 tons at the present time. Consumption has similarly increased in Australia, South Africa and most of the European countries also. Efforts are, therefore, being made in some of the producing areas particularly in Africa to develop the cashewnut processing industry and to extract the kernels on a commercial scale.

In Africa, the cashewnut crop is distributed mostly in Portuguese East Africa and to some extent in the southern province of Tanganyka on the coastal belt and in the interior as far west as Masasi, Newala and Nachingwea. Based on the place from which they come, the African nuts are known as Mozambique, Angoche, Ibo and Lorenco from Portuguese East Africa and Angoche and Dares-Salam from British East Africa. Almost the entire exportable cashewnut crop from these regions goes at present to India for processing. But attempts are being made by some of the European firms experienced in India to set up factories in these producing areas. The only factory processing cashew kernels in East Africa is a small concern at Kailifi in Kenya. The authorities in Africa, are also encouraging the processing of local nuts and are trying to organise the industry in other ways. But the main difficulty in all these areas has been noticed to be inadequate supply of skilled and experienced labour. Most of the processing is done by manual labour and as they are not readily available at low rates of wages as in India, the manufacturing costs are high and these concerns are not able to compete with the Indian kernels. This position is not likely to be disturbed in the near future. India should not, however, rely too much on the supply of imported nuts to meet the needs

of the factories and the export trade. The dependence on foreign nuts should be reduced to the minimum and necessary measures taken to step up indigenous production so as to reduce the costs and offer more competitive prices in the world markets.

2. Position of the industry in India

(i) *Some facts regarding cultivation*

The cashew tree (*Anacardium occidentale*) is not a native of India but has been introduced into this country from Brazil by the Portuguese nearly 400 years ago. Although first introduced for the purpose of checking soil erosion, the cultivation of this crop has gained great commercial importance in India during the last quarter of a century. The tree is grown for its fruits which are known as cashewnuts. The cashewnuts are processed further to obtain the oil and inner kernels which have great commercial value.

The cultivation of the cashew nut crop is concentrated in the West Coast and East Coast of the peninsular India. By far the largest area of this crop is found distributed in the Madras State in the two districts of Malabar and South Kanara. To a small extent the crop is grown in the East Coast in the districts of Vizagapattam, South Arcot, Tiruchirapally, Tanjore and the East Godavari. Cashewnut trees are also found scattered in several other districts of the State including Chinglepet and Guntur. In Travancore-Cochin, which is the next important growing-area for cashewnut, the tree is met with practically in all parts of the State but the *talukas* of Chirainkil, Kottarakara, Kunnauthnad, Trichur, Kilimanoor and Kunnamkulam are the most important. The crop is met with in parts of Ratnagiri and North Kanara districts of the Bombay State and also in portions of Mysore and Coorg.

Ordinarily the tree grows to a height of 20 to 25 ft. in plantations but under certain favourable conditions, reaches far greater heights. It has an extensive root system and is, therefore, able to establish itself even on poor and rocky soils as waste lands are generally selected for the cultivation of this crop. It grows on laterite soils with a rainfall of over 120 in. as in the West Coast and does equally well on the sandy soils of the East Coast districts of Madras where the rainfall is less than 35 in. It is drought-resistant but cannot withstand frost. The cultivation of this crop depends entirely on seasonal rains and a regular monsoon, therefore, becomes an essential condition for the successful cultivation of this crop.

At present, no systematic method is adopted for the cultivation of this crop. The tree is grown in gardens, and house-compounds inter-spersed with mangoes, coconuts and arecanuts. Invariably, it is planted in the corners of numerous house-compounds and outlying areas which are considered as unsuitable for the growing of any other crop. The cultivation is simple and does not consist of any elaborate preparatory or after-cultivation operations. When grown on a plantation scale, small pits are dug at a distance of 25 to 30 ft. at the beginning of the south-west monsoon and one or two dry cashewnut seeds (with shell) are put into each pit and covered over. The seed germinates rapidly within two weeks and develops an extensive root system. Thereafter, practically no

attention is paid to the crop either by way of watering, manuring or other kinds of inter-cultivation, and being a very hardy plant it comes up well even under diverse conditions of soil and climate. Flowering takes place in the months of December and January. Light showers at this time are said to be beneficial for the crop whereas prolonged cloudy weather at this stage is said to reduce the yield of nuts. The fruits which consist of swollen peduncles known as cashew apples and the cashewnut borne on the extreme end, are harvested in the months of March, April and May. The actual yield per tree depends upon a variety of conditions and may vary from about one pound of dry raw cashewnuts per tree in the case of close plantations to as much as 40 to 50 lb. per tree where only 60 to 70 trees are planted per acre. In Travancore-Cochin, the number of trees planted per acre has been found to vary from 50 to 200 in Quilon and Kottarakara, and as much as over 1,000 in some of the areas in the Trichur district. In the latter case it was noticed that the crop was grown mainly for fuel purposes. In the forests of Mysore State where the cashewnut plantations have been recently introduced, the number of trees varies from 75 to 100 per acre which seems to be the optimum number to be planted on a plantation basis. On an average the yield per tree on the West Coast may be taken to be 20 lb. while in the eastern districts it is slightly higher. The higher yield on the East Coast is largely attributed to the scattered nature of the crop and its consequent greater growing areas.

The cashew tree generally begins to bear fruit three or four years after planting. Upto the tenth year the yield is poor but it goes on increasing and between the seventh and tenth year the maximum yields are obtained. Thereafter, for about 20 years the tree yields a satisfactory crop. The average life of the cashewnut plantation is estimated to be 35 to 40 years.

(ii) *Total area under cultivation*

The total area under cashewnut cultivation in 1951-52 was 2,23,128 acres distributed as follows:

Madras	1,35,039 acres
Travancore-Cochin	82,925 ,,
Bombay	4,509 ,,
Coorg	155 ,,
Mysore	500 ,,
Total	2,23, 228 acres

Accurate statistics of this crop are not maintained in the producing States but available information shows that with the rapid development of the cashewnut processing industry the acreage under this crop has also greatly increased in recent years. The maximum increase has taken place in the Madras State where the crop has increased from about 45,000 acres during the pre-war period to 1,35,039 acres at the present time. We noticed that there is further scope for extending cultivation in Malabar and South Kanara in

the West Coast and in the East Coast districts of Chinglepet, Tanjore East Godavari, South Arcot, Visakhapatanam and Tiruchirapally. Similarly, the crop could be extended in other growing areas also particularly in North Kanara and Ratnagiri districts of the Bombay State. The fact that the cashewnut tree comes up well even on waste lands in these areas should be taken advantage of to extend its cultivation. It is a cash crop which increases the small income of the common man and can be cultivated, without affecting the raising of food crops. With suitable encouragement, the area under this crop could be considerably increased in India.

(iii) *Internal supply of cashewnuts*

The indigenous production of raw cashewnuts during 1951-52 was estimated at 60,100 tons, as shown below:

Madras	33,000 tons
Travancore-Cochin	20,000 ,,
Bombay	4,500 ,,
Others	2,600 ,,
Total	60,100 tons

More than half of the total production of cashewnuts is in the Madras State concentrated mainly in the two West Coast districts of Malabar and South Kanara. These two districts together account for nearly two-thirds of the total production in the Madras State. Travancore-Cochin produces small quantities and it is the next important producer of raw nuts. The processing of raw nuts is also largely carried out in this State in its factories at Quilon. Nearly 150 factories are located at Quilon and more than three-fourth of the export trade in cashewnut kernels also emanates from this State. In the Bombay State, cashewnut production is confined mainly to the coastal districts of Ratnagiri and North Kanara of which the former is the more important. The areas of concentrated production in the Ratnagiri district are the *talukas* of Vengurla and Malwan which are also the important processing centres for this crop.

The crop produced in other areas is small and includes those obtained from Coorg and Mysore and certain areas of West Bengal and Orissa.

The total supply of cashewnuts in different States of the Indian Union during 1951-52 has been reckoned at slightly over 60,000 tons. As against this figure, the total supply during 1938-39 to 1940-41 has been estimated at 45,400 tons which shows that cashewnut production in India has increased to the extent of nearly 15,000 tons or 33 per cent during the past decade. Both the area and production show an increasing trend in recent years and enquiries have shown that there is further scope for expanding the cashewnut cultivation in most of the producing areas so as to meet the needs of the Indian factories and our export trade.

Cashewnut is produced in very small holdings, each cultivator often owning not more than a few trees. The existing trees are found scattered and the outturn available for sale with an average

rmer is, therefore, too small, not exceeding a few pounds. The ajority of these small producers do not find it worthwhile to take eir produce to large assembling markets or factories.

A major portion of the crop is collected by itinerant dealers who ring the marketing season go about from house to house in the ain producing areas and collect their produce. A small quantity the nuts is disposed of by the farmers themselves at the primary arkets. At these primary markets, the itinerant merchants operate d collect the produce from producers. During the marketing ason, a number of wholesale merchants and agents of various ocessing factories begin functioning in these primary markets and ovide a keen competition for the purchase of these nuts. Through broker they contact the itinerant merchants who have got ade- ate quantities of these nuts and arrange for purchases The nerant merchants arrange to supply specific quantities and get mediate payment. Such business deals are made without even eing the sample or examining the quality of the nuts. The nerant merchants and the brokers almost dictate the price but ry little of this benefit is passed on to the producer. The margin the itinerant merchants very often varies from 10-20 per cent of e value of the produce.

As already stated the processing centres in India are concentrated the West Coast at Quilon. More than 150 factories are located this place. A major portion of the Malabar crop and almost the tire supplies of Travancore-Cochin are purchased by the Quilon fac- ries. Only a very small percentage of the crop is utilised at alicut and at Mangalore for being processed into kernels. The yers dry the nuts before despatch to the various processing con- rns and make a deduction for the loss due to driage, while making yment to the producer.

r) Imports of raw nuts from foreign countries

Although India is the largest producer of cashewnuts, large quan- ies of raw nuts are also imported into this country. In 1951-52, total imports of raw unshelled cashewnuts into India amounted 42,353 tons valued at Rs. 3·27 crores. During the current year, quantity and value of the imports have both increased and ounted to 51,682 tons and Rs. 4·66 crores respectively (*vide* pendix XXIX). The actual quantities imported vary from year year and largely depend upon the indigenous production of raw ts as well as the export demand for cashew kernels in the rld markets.

It will be seen from appendix XXIX that the main source of r imports of raw cashewnuts is East Africa. Both British and rtuguese East Africa supply this raw material to our processing ctories but by far the largest quantities are obtained from the ter territory. With the growing world demand for cashew nels, there is increasing realisation of the commercial importance this crop in East Africa, particularly in the British Zone where ne plans are already afoot to set up processing factories and to lise the local supplies. Due to the difficulties of labour and un- tainties in the political conditions, these plans have not as yet de much head-way; nor are they likely to progress rapidly in

view of the heavy costs of processing in those countries. Our su plies of raw nuts from this source are not likely to be cut off the near future but the authorities should take note of these tren in the industry and make early arrangements for reducing Indi dependence on these foreign imports by stepping-up indigeno production for which there are immense possibilities.

The imports and distribution of these African nuts are arrang by a few leading firms operating in Bombay. Having branches the East African ports and established long business connections wi these regions, these firms are very influential and hold almost monopoly in the import trade and all the processing factories a obliged to obtain their requirements through them. The facto owners place their orders through these firms which then arran to import the required quantities through their branches in Ea Africa. The cashewnut season in different parts of Africa bei from November to March, the imports into India are also compar tively larger during this period. Purchases are arranged on forwa delivery basis and necessary business transactions are settled August-September before the cashewnut season commences in th country. Up to March, therefore, the Indian factories make use the imported nuts and from March onwards utilise the indigeno crop which starts moving into the markets by then. Nearly thre fourth of the imported quantities are purchased by the processin factories at Quilon in Travancore-Cochin and the rest largely b those at Calicut and Mangalore.

The imported nuts as well as the local crop are utilised for th manufacture of kernels but the total supplies are found to b inadequate to meet the requirements of the processing factorie Most of these factories find the present supplies sufficient only fo 9 to 10 months in a year and have to remain idle for the remainin 2 to 3 months. This clearly emphasises the urgent need for expan ing the local cultivation of this crop.

The main point in favour of the imported cashewnuts is tha their loss of weight during drying or transit is very small. Th is due to the fact that in East Africa, particularly in the souther Provinces, the nuts are not gathered till these have fallen to th ground from the trees. The produce collected is, therefore, ful ripe and mature and the kernels inside are also fully formed. I India, on the other hand, due to scarcity of supplies and dema from the factories large quantities of immature nuts are annuall plucked from the trees and marketed in this State. The loss weight of these nuts during drying has been found to vary from 10 15 per cent. This loss could be avoided and the indigenous supply raw nuts could be increased if we could stop the practice of harves ing unripe nuts. In East Africa, the nuts begin to mature fro September onwards but the crop is gathered only after it has falle to the ground and the marketing season commences still late Similar delays in the marketing season of the crop would be helpfu to obtain larger proportion of mature nuts in the commercial su plies to the factories.

(v) *Total supply of raw nuts and processed kernels*

The total supply of raw unshelled cashewnuts in India durin 1951-52 has been estimated at 1,02,353 tons which included 60,0

Fig. 26. Cashewnut attached to the swollen peducles or cashew apple

tons of indigenous production and 42,353 tons of imported nuts. The average recovery of cashew kernels is estimated at 25 per cent in the case of Indian nuts and 26 per cent in the case of African nuts. On this basis, the total outturn of kernels of the various cashewnut processing factories in India may be reckoned at 26,000 tons. In 1952-53, the total supply increased by nearly 3,000 tons. In as a result of the processing of the larger quantities imported during the season.

(vi) *Processing*

The cashew kernels of commerce are obtained by processing the raw unshelled cashewnuts in various ways. These include such processes as roasting, shelling and peeling. Roasting makes the shell brittle and facilitates the extraction of kernels and also imparts a special flavour to the kernels. To obtain kernels of good quality, the raw nuts have to be uniformly roasted. Until recently, the main object of roasting was only to obtain uniform roasting, but with the increasing importance of cashew shell liquid, attempts are being made to evolve a process which combines uniform roasting with the maximum recovery of the shell-oil also.

Roasting is both a delicate and difficult process and unless it is properly done the quality and recovery of kernels are adversely affected. The pungent smoke which escapes during the roasting of nuts is injurious to health and the cashew shell liquid which exudes from the shells has a corrosive action on the hands and fingers of the workers. While some of the factories paid attention to these factors, the standard of amenities provided to the workers in others was found to be poor. Unless adequate facilities are provided to safeguard the health of the workers, majority of whom are women, the efficiency of the workers will not improve.

The four methods generally employed for roasting are (i) open pan, (ii) earthern-wares, (iii) rotary cylinders and (iv) oil baths. The first two methods are simple and are more widely adopted in all the producing areas. They are also cheap and do not involve any capital outlay. The main defects are that there is no proper arrangement for the recovery of the oil or to protect the worker against the fumes and oil escaping during the process. The rotary cylinders are an improvement over the open pans or the earthernware method of roasting cashewnuts. This system is also efficient and hygienic as far as roasting is concerned, but a larger proportion of the shell-oil is not recovered by this method also. The cost of setting up rotaries is, however, far higher as compared to the previous two methods. The new method combining good roasting with the maximum recovery of shell-oil is provided by the oil bath system. The oil-bath system, as its name implies, provides an oil bath consisting of cashew shell oil itself, the temperature of which is maintained at about 200°C. Raw cashewnuts which are to be roasted are held in wire trays and passed through this hot oil bath for about one minute during which time, due to the high temperature of the bath, the oil cells of the raw nuts burst and release the content into the oil bath. The overflowing oil is drained and collected simultaneously. At the same time, the shells get roasted to

the desired degree so as to facilitate the extraction of kernels. Although this system is most efficient, it is too costly to be widely adopted in the manufacturing centres.

After roasting, the shells have to be removed from the roasted nuts and the kernels have to be extracted. Unless the shelling is done carefully and skilfully, the kernels are likely to be broken and the recovery of whole kernels is bound to be poor. The shelling operations are, therefore, done by hand by employing a large number of labourers, mostly women. The kernels as extracted from the shells are covered with a thin brownish skin or outer coating which has to be removed before the produce can be made fit for human consumption. To facilitate peeling, the kernels are first dried in the sun or in specially constructed hot-air chambers. Like shelling, peeling is also carried out by human labour, consisting mostly of women and children.

The kernels as received after peeling are in a dry and brittle condition and are liable to breakage during package and transport. These are, therefore, allowed to absorb some moisture by keeping in moist chambers before these are finally packed into tins for export purposes.

It was noticed that most of the processes involved in the manufacture of commercial cashew kernels were being done by manual labour. Apart from being an important producing area, the availability of sufficient skilled labour at low rates of wages has been largely responsible for the concentration of the cashewnut processing factories in the West Coast.

(vii) *Number and location of processing factories*

Up-to-date statistics of the actual number of cashewnut processing factories in India are not available. It is, however, estimated that these number in all over 140 out of which about 50 factories are registered under the Factories Act and the rest are all managed on a cottage industry basis and do not, therefore, maintain proper records of production.

Most of these processing factories are situated in Quilon in Travancore-Cochin. More than 100 of these are concentrated in this region and half of the remaining number is distributed in Malabar (Calicut) and South Kanara (Mangalore). The proximity to the producing areas and the availability of sufficient skilled and experienced labour at low rates of wages have largely been responsible for the concentration of these factories in these regions. Other factories are located in the East Coast districts of South Arcot (Panruti), Guntur (Vetapalam) and Visakhapatnam (Palasa) as well as at Malvan and Vengurla in the Ratnagiri district of the Bombay State.

(viii) *Average recovery of kernels and shell oil*

On an average, the weight of the cashewnut shell comprises of 70 to 72 per cent of the total weight of the raw cashewnuts. The weight of the unpeeled kernels thus amounts to 28 to 30 per cent of the unshelled nuts. Nearly 12 per cent of this represents the

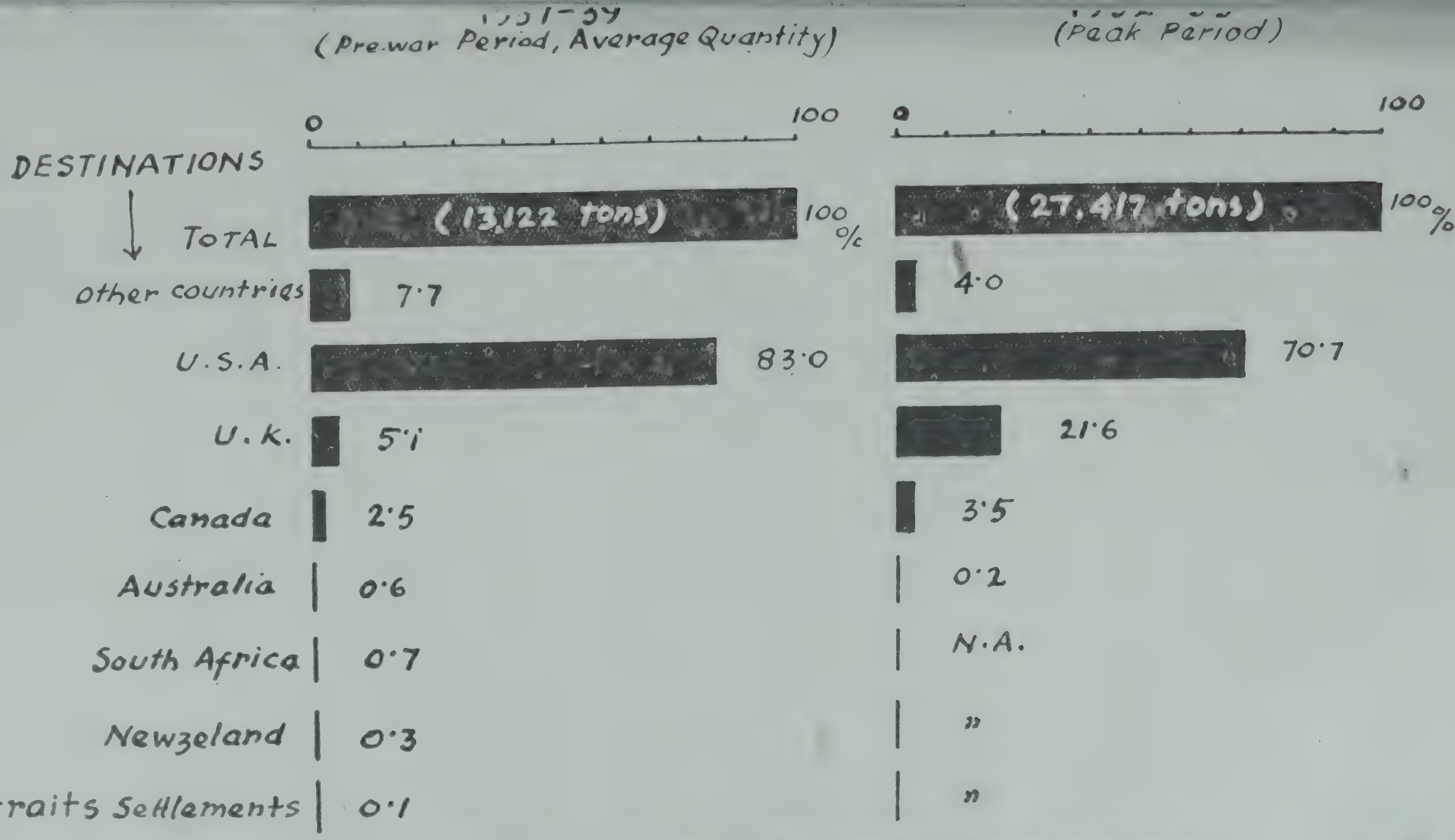


Fig. 27. Percentage export of cashew kernels from India to different countries of the world

weight of the peels and only the remaining is obtained as cashew kernel of commerce. The kernels are recovered as who brokens, and splits and the percentage recovery of different qu ties has worked out as follows in one of the factories:

Whole kernels—best quality	9.94 per c
Second	5.69 „
Brokens—best quality	4.10 „
Second	5.33 „
Total	25·06 per ce

The best wholes consist of 210 to 400 counts. But the yield higher counts such as 210 and 240 is negligible in the case of t inferior imported nuts which gives more of 280 s. and 320 s. on The Indian nuts are, therefore, preferred for obtaining high gra kernels.

The Indian nuts are preferred also for the extraction of th cashew-shell liquid. The shell comprises of 70 to 72 per cent of th total weight of the raw nuts and 24 to 25 per cent of the weight the shell consists of the oil known as cashew-shell liquid in com merce. Actual recovery of oil in most of the factories is, howeve much smaller and averages only 10 to 12 per cent even by the oi bath method of processing which emphasises the need for furthe improvements in the methods of processing.

(ix) *Export trade in kernels*

Bulk of the cashew kernels processed in India are exported t the foreign markets. With the modern developments in packing the pace of these exports has also quickened in recent years. Th export of cashew kernels from India was hardly less than 1,000 ton nearly a quarter of a century ago. This increased to 14,000 ton before the war and reached the maximum of 27,417 tons durin 1952-53. The value of these exports has also correspondingly in creased from Rs. 1·29 crores before the war to Rs. 12·76 crores durin the current year. More than three-fourth of these quantities ar exported to the U.S.A. which is our largest consumer. Other im portant importers are the U.K. and Canada but their off-take i comparatively small (*vide* appendix XXX and diagram). Consider ing the growing popularity of the Indian cashew kernels in these consuming markets, there is further scope for expanding our world trade in this commodity and for earning more foreign exchange.

The cashew kernels exported to the various countries are o recognised quality. Generally bold and whole kernels are in demand for export purposes but considerable quantities of brokens are also exported from India. Apart from these wholes and brokens, a third quality known as 'scorched' is also exported. The scorched kernels

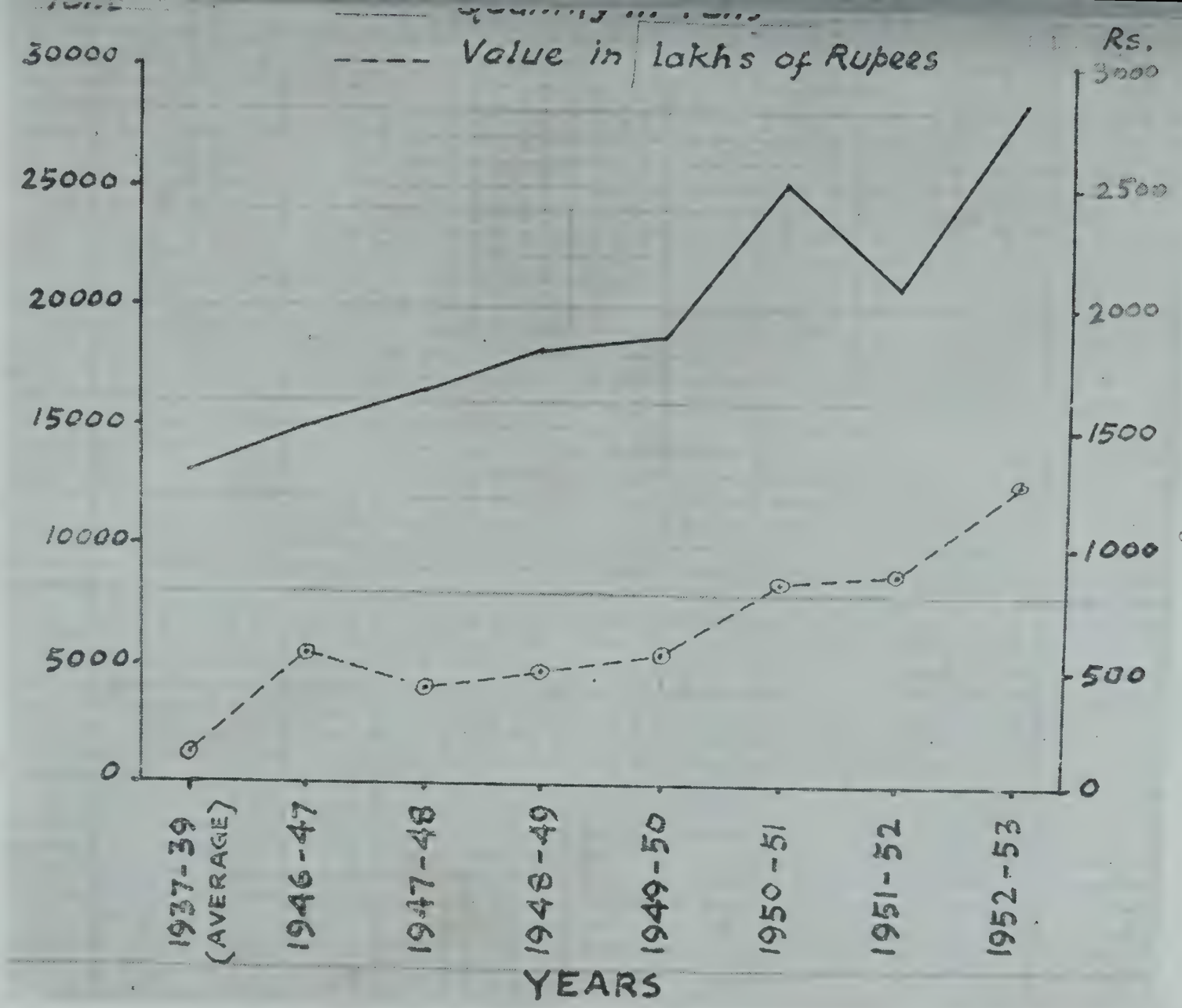

Value in lakhs of Rupees
Rs.
30000
25000
20000
15000
10000
5000
0
3000
2500
2000
1500
1000
500
0
1937-39 (AVERAGE)
1946-47
1947-48
1948-49
1949-50
1950-51
1951-52
1952-53
YEARS

Fig. 29. Shelling of cashewnuts in one of the factories in the West Coast.

Fig. 30. Different grades of whole kernels based on 'Counts' (American standard)

present the over-roasted kernels which have a little burnt appear-ce. Second sorts of these three main qualities are also widely evalent in the export trade and are sold under the name of cond wholes', 'second brokens', etc. Although the grades and alities vary from firm to firm, the exporting firms are all aware the specific quality characteristics based on the size, colour of e kernels and the proportion of brokens in the lot. The standards nerally adopted are based on the 'count' system (American stan-rd) which represent the number of kernels per pound of the lot. though there are slight variations, the present system of grading d trade classification appears to be working fairly satisfactorily.

For export, the kernels are packed in standardised wooden cases ntaining two tins of 25 lb. each. After filling the tins with the rnels, the tins are hermetically sealed usually by the vita-pak ethod. Certain firms pack the kernels under carbon dioxide gas hich is introduced into the tins after exhaustion. The storage life cashew kernels under these conditions exceeds one year. In spite these precautions, foreign buyers sometimes complain of wormi-ess in Indian consignments. The exporters should, therefore, remedy is defect by paying more attention particularly to (1) the environ-ental hygiene of the processing factories in India, (2) the use of ew and better tin containers for packing kernels, (3) the wider se of airtight packing as in the vita-pak method and (4) by adopting niform grade standards on an all-India basis.

c) *Internal trade in kernels*

No reliable data is available to indicate the demand or trend f the internal trade. But the general view is that there is been a steady increase in the demand for this product in the me market. The demand and consumption of the roasted and lted cashew kernels has particularly increased. Due to their mparatively high prices, the consumption of these kernels is, owever, as yet confined to the well-to-do classes in cities and wns. The total internal consumption is limited to hardly 2,000 to 000 tons. The main source of supplies are the East and West Coast egions. The production from the West Coast factories is distributed ainly through the Bombay port to other States of Northern India, articularly, Delhi, Punjab, Rajasthan and Madhya Pradesh. The ernels produced in the East Coast districts are despatched to Orissa, engal, Assam, Bihar and Uttar Pradesh.

Cashew kernels are used in India for a variety of purposes. The oasted kernels are consumed as such like other dry fruits or they re used for flavouring sweet dishes. There is also a growing demand r salted kernels in recent years. These kernels compare favour-bly with other dry fruits like almonds, walnuts and pistachios in od values (*vide* appendix XXXI) and their consumption is bound grow provided the prices are within the means of the average nsumer.

(xi) *Prices*

The trend of prices of both raw cashewnuts and processed cash kernels may be seen from Table I.

TABLE I

Trend of cashewnut and kernel prices at Cochin

Yearly	Raw cashewnut (Rs. per md.)	Kernel (U. S. cents per lb., 1—320 counts)
1942	6— 8	187
1943	9—11	267
1944	11— 4	448
1945	14— 0	384
1946	15—10	352
1947	10— 9	240
1948	12—13	261
1949	15— 0	251
1950	18— 5	251
1951	20— 8	277
1952	26—12	—

The prices of both raw cashewnuts and the processed kernel have steadily increased since world war II (*vide* appendices XXXI to XXXIV). The increase has been, however, most marked in th case of raw nuts than in the kernels. From hardly Rs. 6-8 pe maund in 1942, the prices of raw nuts increased by 215 per cent an stood at Rs. 20-8 per maund in 1951. While the kernel price moved up from 187 cents per pound in 1942 to 277 cents per poun in 1951 and increased by only 48 per cent during this period Compared with the general rise in the level of post-war prices, th increase in both these cases should be considered meagre. The comparatively larger increase in cashewnut prices is mainly due t the shortage of supplies and the greater demand from the various processing factories. With the improvement in the supply position of nuts, the processing factories will be able to reduce the produc- tion costs and be in a better position to offer more competitive prices for kernels in the consuming markets.

Price differences on account of quality also exist both in regard to the raw nuts and the kernels. The local nuts are superior and fetch a higher premium of generally 5 to 10 per cent over the imported produce. Even in indigenous production, certain localities are noted for their fully ripe and mature crop which, therefore, receives a premium of 5 to 6 per cent over the average qualities. In the case of kernels, the shipment qualities number over ten but

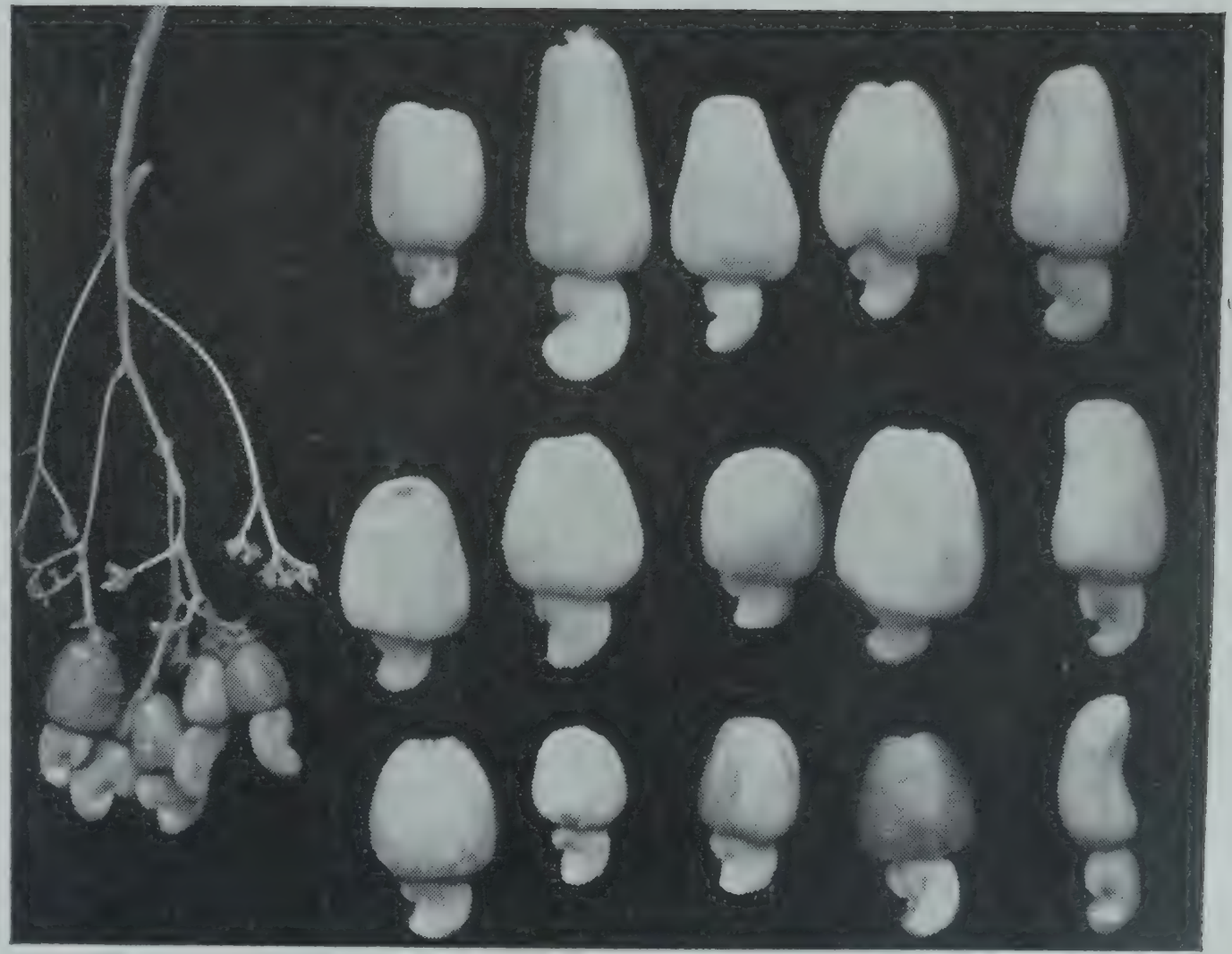


Fig. 31. Variations in cashew apple and nut characters

these can be broadly classified under three qualities, namely wholes, bulbs and splits and pieces. The whole kernels are the best quality and are always in greater demand and these qualities receive 10 per cent higher price than that for the bulbs and splits and as much as 25 to 30 per cent more than that for the pieces.

(xii) *Distribution of kernels*

The main distributing markets for cashew kernels in India are Bombay, Calcutta, Kanpur, Delhi, Indore, Nagpur, Ahmedabad, Belgaum, Hyderabad and Bangalore. Wholesale merchants who deal in other dry fruits, spices and other articles in these markets contact the processing firms in the West Coast region as well as in the East Coast region and generally obtain their requirements direct from them. Prices are quoted on f.o.b. basis and the importers in these distributing markets have, therefore, to pay only freight and other incidental charges such as cartage, octroi and labour at their end.

The important centres of supply are Quilon and Alleppey in Travancore-Cochin, Calicut, Managalore and Panruti in Madras, Vetapalam and Palasa in the Andhra State and Malvan and Vengurla in the Bombay State. The kernels processed in the West Coast factories are mostly exported to the foreign markets. But the remaining quantities are distributed mainly through Bombay. Almost the entire output of the East Coast factories at Palasa, Vetapalam and Panruti is also utilised for inland distribution.

The distribution of the processed cashew kernels in the foreign markets is carried out chiefly by the factory owners themselves. Some of the large processing concerns have their own trade representatives or commission agents in New York while a few others combine themselves into a corporation and arrange for the distribution through a common office in the foreign markets. Other manufacturing concerns who have no such direct connection with the foreign markets sell their product to the former two agencies or to the commission agents at Bombay who also handle a small part of the export trade in cashew kernels. The representatives of these agencies in the foreign markets keep their parties in India informed of the position regarding stocks, trend of demand and prices and also arrange to secure orders for them from the buyers and are paid $1\frac{1}{2}$ to $2\frac{1}{2}$ per cent of the value of the sales effected through them as trade brokerage.

The distribution in the foreign markets is done in two instalments during the year, but is largely concentrated from September to December. The prices quoted during this period are on the basis of the quotations for the nuts imported from East Africa while the subsequent quotations which are made from January to March are on the basis of the prospects of the indigenous supply of cashewnuts. The exports are made on c.i.f. basis and on the basis of written contracts; and shipments take place within three or four months of the date of the contract. Ninety-five per cent of the invoice value is reimbursed on shipment of the consignment while the remaining five per cent is reserved by the foreign buyers against possible claims of quality. It has been noticed that the processing costs have remained stationary round about Rs. 5 per maund during the past few years. The charges for packing and transport have

also not increased. While the manufacturing costs have remained more or less constant, the freight charges have increased greatly. Before the war, the freight rates for shipment from Cochin to New York amounted to Rs. 55 per shipping tons of 28.25 cases containing 50 lb. each. This has increased to over Rs. 150 at the present time. Unlike the trade in raw cashewnuts, the distribution of kernels both in the inland and foreign markets is better organised and is conducted more efficiently. The main handicap noticed in most cases was in regard to publicity. With proper arrangements for publicity and contact in the foreign markets, various processing concerns could considerably increase their sales in these markets.

3. Research, technology and development

(i) *Research*

The Indian Council of Agricultural Research sanctioned three schemes of research on cashewnuts to be worked for five years with effect from the 1st April, 1951 in the producing areas of Madras, Travancore-Cochin and Bombay. According to these schemes, three cashewnut research stations will be opened at Mangalore, Kottarakara and Ratnagiri respectively in the above States. The main object of the Madras scheme is to extend the cultivation and improve the yield of cashewnuts from the existing plantations. The items of research to be covered under this scheme are (i) survey of the existing cashewnut plantations in South India, classification of different types and formulating a key for their description, (ii) selection of promising types including foreign varieties, (iii) standardisation of propagation methods, (iv) raising and trials of promising types, (v) study of the factors influencing flowering, bearing and fruit setting and (vi) the study of the relationship between soil and the nutrients and soil-moisture on flowering and fruit setting.

The research work at the Bombay and Travancore-Cochin stations will be confined to the study and applications of the cultural practices and will include such specific items as (i) regional survey with a view to selecting suitable varieties for perpetuation, (ii) evolving suitable nursery techniques of the region, (iii) testing of selected varieties and (iv) the study of factors influencing flowering and fruit-setting.

Although the schemes are quite comprehensive, the stations have not started active research work mainly due to lack of financial assistance from the respective State Governments. Being busy with their food production activities, it is not likely that these States will also be in a position to divert funds for the development of this industry. The question of full central assistance for a specified period should, therefore, be explored. Being a perennial crop, permanent results can be expected only by working the schemes for a period of 10 years.

These research stations should also carry out investigations on the local pests and diseases of the crop. There are not many pests or diseases noticed on this crop but it has been reported that the 'die-back' disease causes serious damage in some years to the cashewnut plantations in South Kanara and Malabar while the stem-borers form the major source of trouble in other areas. Effective plant protection measures against these diseases and pests should be found out.

(i) *Technology*

Until recently, extraction of kernels with minimum breakage sses has been the main objective aimed at in the cashewnut in- ustry. With the increasing realisation of the technological possi- lities of the cashew-shell oil, the extraction of oil has also assumed eat commercial importance. Statistics of the total supply of oil of the quantities exported are not available but it is estimated at the annual production of cashew-shell oil in the various fac- ries of India varies from 7,000 to 9,000 tons and the total value the exports made in 40—45 gallon drums exceeds over Rs. 60 khs. In 1942-43, the price of this oil amounted to hardly Rs. 120 er ton This has increased to over Rs. 1,200 at the present time.

Cashew-shell oil is a dark brown viscous liquid which has many ndustrial uses. These industrial uses are based on the fact that ne oil polymerises to a rubber-like material under the influence of cids and also forms a wide range of condensation products with ldehydes. Though not a glyceride, it is a drying oil and is also asily soluble in most organic solvents.

The oil is directly used as a water-proofing agent and as a reservative in the painting of boats, fishing nets and light wood ork. Besides these direct uses, it serves as an important raw mate- ial in many industries such as the manufacture of insulating var- ishes, type-writer, rolls, oil and acid-proof cold-setting cements ndustrial flooring tiles and automobile brake linings. It is also used n the preparation of cement and adhesive ingredients, pigments for ums, inks, oil-cloth, paints, varnishes, etc., and water-proofing paper nd card-board-finishing reagents. Considerable research has been onducted both in India and foreign countries on the technological ossibilties of this oil. What is required is to give wider publicity to nese findings among the Indian industrialists. Researches should, owever, be carried out for finding out some uses for the cashewnut ells and also for evolving a cheaper type of oil-bath machine for e extraction of the oil.

Chemically, the cashew-shell oil consists of anacardic acid cardol nd fatty matters and has been found to have the following nalysis:—

Specific gravity at 26°C	1·0131
Refractive index at 41·5°C	1·5158
Saponifications number	119
Iodine number	296
Acid number	107

As the industrial utilisation of this oil will depend largely upon ne quality of the product, it is necessary to manufacture standard ualities. The Indian Standards Institution has already framed some andard specification in this connection. Attempts should now be ade to encourage their adoption by the various manufacturers.

Another by-product of the cashewnut industry which offers scope or technological research and development is the cashew-apple. hese are the swollen peduncles supporting the cashewnuts. When pe, these apples are quite sweet and being rich in sugars, the

juice can be boiled into syrups. It can also be used for makin vinegar, jams and fruit preserves. Nearly 2,70,000 tons of cashe apples are estimated to be produced in the country annually bu only less than 15 per cent are at present utilised for various pu poses. There is, therefore, scope for greater utilisation of this b product which should be fully exploited.

(iii) *Maintenance of statistics*

Statistics are not maintained in India in regard to the area unde cashewnut cultivation or of the production of nuts and processe kernels. Nor is any information readily available regarding stock and internal trade movements. Such information is particularl needed in the case of the cashewnut industry where most of th factories are reported to remain idle for nearly 2 to 3 months o the year. The planning and development of the industry will b greatly facilitated if such data are regularly maintained.

(iv) *Publicity in foreign markets*

Specific instances have been brought to our notice that th cashew kernels from India are sometimes sold as of Brazilian origi in the American and other foreign markets. Early measures shoul be taken by the Central Government to counteract such fraud i respect of the origin and quality of the Indian product by makin proper arrangements for publicity in the foreign countries. These measures should include also the preparation of a documentary film and its exhibition in all consuming markets.

Publicity should also be given regarding the rich food value of the cashew kernels. Experiments have shown that the cashe kernels of commerce compare favourably with such other dry fruit as walnuts or almonds as regards their oil, protein and vitamin con tents. There is already a growing demand for this product an with dissemination of such information, the demand for this dr fruit is bound to increase both in the internal and foreign market

4. Summary of conclusions and recommendations

(i) *General outlook*

Though Africa and other tropical countries are important pro ducers of raw cashewnuts, the processing industry is concentrate in India. India forms the principal source of supply o cashew kernels in the world markets and accounts for more tha 95 per cent of the international trade in this product. With th growing demand for cashew kernels in America and Europe, thi Indian industry has a bright future.

(ii) *Main problem*

Out of 26,012 tons of cashew kernels produced in India durin 1951-52, nearly 21,000 tons were exported and entered into inter national trade. Nearly half of this quantity was extracted from ra cashewnuts imported from East Africa. These imports from foreig countries are valued at Rs. 3.3 crores. The immediate problem of th cashewnut processing industry is to reduce India's dependence o foreign imports by taking early steps to increase the supplies o raw cashewnuts within the country.

In spite of the large quantities imported into the country, the cashewnut processing factories in India did not have adequate supplies of raw cashewnuts to utilise their present installed capacities to the full. It was found that both the local production and the imported nuts provide work only for 9 to 10 months of the year and for the remaining period, the factories have to remain idle. This clearly emphasises the urgent need for stepping up internal production of cashewnuts in any case.

(iii) *Increase internal supply of raw cashewnuts*

In India, the cultivation of the cashewnut crop is concentrated in the western sea-board. There are, however, extensive lands available for cashew cultivation in the East Coast region of Madras, the coastal districts of Ratnagiri and North Kanara in the Bombay State and parts of Coorg and Mysore. In all these regions, extensive cultivation of the crop on a plantation basis should be encouraged. The forest departments in the producing States should also encourage its spread and growth in all the reserve areas and arrange to collect the nuts along with other minor forest produce. Wherever possible, the Public Works Departments should also undertake to extend the cultivation of this crop in suitable lands under their jurisdiction. A Coordinated Ten Year Plan (Cashewnut Plantation Scheme) should be prepared in this connection in consultation with the State Governments and put through expeditiously.

(iv) *Greater central aid for agricultural research*

Although sanction has been accorded by the Indian Council of Agricultural Research for the starting of three regional research stations for cashewnut at Madras (Mangalore), Bombay (Ratnagiri), and Travancore-Cochin (Kottarakara), actual research work has not commenced in any of these regions, mainly due to the lack of funds. We recommend that adequate funds should be made available by the Central Government, so as to enable the respective States to overcome the financial difficulties and start systematic scientific studies at these three research stations without any further delay.

The economic and botanical characters of the crop have received little attention at the hands of scientific workers nor has any effective remedy been found out for combating the pests and diseases of the crop such as stem-borer, powdery mildew, die-back, etc. All these aspects should be investigated at these research stations.

Although the cashew tree is propagated by means of seeds, vegetative methods have yielded promising results in some of the experiments conducted by the Madras Government. The potentialities of this method for the distribution of improved planting material should also be investigated.

(v) *All-India crop estimates*

Except what is given out by some of the leading business firms in the West Coast region, no attempt has been made by the Governments at the Centre or in the States to publish regular forecasts of the local production of cashewnuts, cashew kernels and cashew

shell liquid. Considering the size and value of the crop and the importance of the products as dollar-earners, it is necessary to maintain these statistics on an all-India basis.

(vi) *Quicker transport to the factories*

The movement of raw cashewnuts from the assembling centres or the ports to the factories has to be done quickly. Apart from pilferage losses, delay in this matter results in exposure of nuts to unfavourable weather conditions which adversely affect the recovery of good quality kernels. The railway authorities should, therefore, give greater facilities for the quick transport of the raw nuts to the processing factories.

(vii) *Government assistance for procurement of raw nuts*

While bulk of the Indian cashewnut crop is collected by itinerant merchants, the imports of foreign nuts are done mainly through a few influential firms for whom this forms only a side-business. The Government should, therefore, give all assistance to the factory owners in regard to the procurement of raw nuts from foreign countries.

(viii) *Standardising local methods of marketing*

The system adopted in the marketing of local raw nuts is defective in many respects. The various market practices and charges do not enable the producers in the villages to realise the maximum share of the price paid by the factory owners. The producer's share is sometimes reduced to as much as 50 per cent of the factory price. Even when the product is dry, deductions on account of driage are often made to the extent of 3 to 5 per cent. These market practices and charges prevailing in the village transactions should be put on a rational basis. As formation of producers' cooperative societies is difficult in the case of cashewnuts, we suggest that the buyers in the primary and assembling markets should be licensed by the State Governments and the issue of such licenses should be subject to the condition that the licensee should buy only ripe and mature nuts and use standard weights in the transactions.

(ix) *Adopting better methods of processing*

Out of the various methods of processing employed in the extraction of cashew kernels from raw nuts, the oil-bath method is more efficient. By this method, the yield and quality of the kernels are better. The recovery of cashew shell liquid, which is a valuable by-product of the industry, is also greater in this case. The cost of the equipment and installation charges are, however, heavy. Small owners of cashewnut factories should, therefore, combine themselves into recognised associations and necessary financial assistance should be given by the governments to such associations in the form of loans for the setting up of such improved processing plants.

The Council of Scientific and Industrial Research should also take up for investigation the possibilities of evolving cheaper processing plants.

(x) *Uniformity in grade standards*

Excepting small quantities consumed in India the bulk of the cashew kernels produced in the country is exported to the foreign markets. These exports are according to the American standards of quality which are based on the 'count system'. Although this system is working satisfactorily, we consider that it will be helpful to the manufacturers and consumers alike if all-India standards of quality are framed for this product under the Agricultural Produce (Grading and Marking) Act and all price quotations are made on the basis of such standard qualities. These standards of quality should then be included in the trade contract terms also.

(xi) *Regulation of quality*

The main complaint heard about the quality of cashew kernels exported from India is that the product gets wormy in certain cases by the time it reaches its destination. The exports are made in standard wooden cases containing two tins of 25 lb. kernels in each. A number of cases shipped from India are reported to have been rejected on account of this defect. In order to minimise such complaints and maintain the reputation of Indian shipments, it is necessary to arrange for the regular inspection of these cases at the ports on a sample-test basis. In order to prevent development of worms in the cases shipped from India, factory owners should (1) pay greater attention to the environmental hygiene of the factory premises, (2) use new tin containers for packing kernels and (3) adopt air-tight packing.

(xii) *Cashewnut Development Fund*

At present, the cashewnut processing industry is concentrated in India and bulk of the world's requirements of these kernels is supplied by this country. The value of foreign trade amounts to Rs. 8-9 crores annually which can be increased further with further expansion of the industry. The exports being mostly to the U.S.A., the expansion of trade in this article will also improve the dollar position of this country. The Central Government should, therefore, create a separate fund and earmark a lump sum of Rs. 25 lakhs for undertaking the various developmental measures stated above. The administration and control of this fund should also vest in the central committee which we have already proposed for developing the spice industry in India.

(xiii) *Indigenous utilisation of cashew-shell liquid*

Nearly 7,000 to 9,000 tons of cashew-shell liquid are obtained every year as a by-product of the Indian cashew industry. This oil has many industrial uses and is, therefore, of great commercial importance. The oil is directly used as a preservative in the painting of boats, fishing-nets, light wood work and as a water-proofing agent. Its distillation products can be used in various industries such as the manufacture of insulating varnishes, typewriter rolls, oil and acid-proof cold-setting cements, industrial flooring tiles and automobile break-linings. Wider publicity should be given to these uses in order to encourage greater utilisation of this by-product by the indigenous industries.

(xiv) *Standardising quality of cashew-shell liquid*

All industrial uses of cashew-shell liquid presuppose a unifor quality of the commercial product. The Indian Standards Instit tion has drafted some tentative specifications for this oil, whi should be adopted by the manufacturers to put a uniform produ on the market. By such standardisation of quality, the exports this oil to foreign countries are also likely to increase.

(xv) *Publicity and sales promotion*

It has been reported that the publicity for cashew kernels in t consuming countries is very inadequate. Specific instances ha been noticed where even the origin of the product has been mi represented. The special export-promotion agencies we have pr posed in the case of pepper should undertake publicity work respect of this product also in their respective areas.

Internally also, publicity is necessary to increase the demand f cashew kernels. Cashew kernels are already becoming popular the Upper India markets particularly in hotels and restaurants an with greater publicity there are still further possibilities of increa ing the demand for this product as an alternative dry fruit whic compare favourably with almond, pistachio, etc.

(xvi) *Amenities for the factory workers*

Quite a large number of persons are employed by the India cashewnut industry. Although certain amenities such as fans, ligh drinking water, nursery, etc. have been provided under the Factorie Act, these were not found to be uniform or quite satisfactory i all the factories. Considering the difficult conditions and the natu of the work involved in processing, it is imperative that the standa of amenities provided in all these factories should be uniformly hig

CHAPTER VI

LEMON-GRASS OIL (*PUL THYLAM**)

1. General outlook

Oil of lemon-grass, which is a valuable dollar-earning article of ndia in recent years, is distilled from the leaves of the grass, *Cymbo-ɔogon flexuosus*, Stapf. Although the grass is met with in ropical countries such as Ceylon, Java, West Indies and Malaya Peninsula, the systematic cultivation of this crop for distillation pur-ɔoses is largely confined to India and Guatemala. Actual figures of ɔroduction are not available but it is estimated that in 1951-52, the otal supply of this oil amounted to 1000 tons, nearly one-fourth of vhich was accounted for by Guatemala and the remaining three-ourth by India. India was thus the largest producer and each year his country also supplied bulk of the world's requirements of this ɔil.

Lemon-grass oil is a basic raw material for the manufacture of nany aromatic chemicals which find wide application in the perfu-nery, soap and cosmetic industries. The modern perfumers use this ɔil for the preparation of what are known as ionones. During world var II, large quantities of this oil were also used by the manufacturers n America and Europe in the synthesis of vitamin A. Besides these, :he oil is directly used in many pharmaceutical preparations such as ɔain-balms and disinfectants.

On account of these industrial uses, the post-war demand and ɔrices of this oil in the world markets increased considerably. Since ast year, however, there has been a decline in the markets and the ɔrices have also fallen. This is attributed partly to the larger sup-ɔlies available in Guatemala and partly to the curtailment of demand ɔarticularly from the vitamin manufacturers in America and Europe. Unless steps are taken to stimulate the internal demand for this ɔroduct for various industrial purposes, the prospects of the industry :re not very bright.

2. Position of the industry in India

i) *Some facts regarding cultivation*

Lemon-grass growing areas. Though lemon-grass is met with in he wild state in many of the slopes of the western ghats, the impor-ant growing-areas are in Travancore-Cochin particularly in the ıorthern *talukas* of the State such as Kuruppampadi, Otakkali, Kothamangalam, Thodupuzha, Muvattupuzha, Vazhakulam, etc. The otal area in the State during 1951-52 has been estimated at 35,000 .cres.

With the migration of many of the enterprising cultivators from .his State to the adjoining areas of Malabar, both the cultivation of .his grass and the distillation of oil have extended to this region also, .hough on a much smaller scale. In the Malabar district, the area ınder the grass during 1951-52, has been reckoned at 4500 acres dis-ributed mainly in the northern portions of the district such as Cali-:ut, Wynad and Taliparamba. The total annual cultivated area under ne crop is thus estimated at nearly 40,000 acres.

* Malayalam name for the oil.

The grass grows with monsoon rains and is usually grown on h slopes in hard laterite soils. Even the fertile slopes of the weste ghats are said to be suitable for the raising of this grass so that t extension of cultivation of this crop does not present any difficul

Cultivation. The methods adopted for the cultivation of lemo grass are very simple and do not involve much expenditure. Duri February-March, the site selected for the cultivation of lemon-gra is cleared of all under-growth of vegetation by burning them. April-May, when summer showers are received, two or three ploug ings are given and the land is prepared into long narrow beds f sowing the seeds. About 15 to 20 lb. of seeds are used for sowing a acre. The seeds are sown broadcast and lightly covered by a bru harrow. Germination is generally complete in about 15 days. O month thereafter a combined operation of weeding, thinning and fi ing up the gaps is carried out in the field. No further care or afte cultivation is given to this crop except that occasionally during sur mer the stumps of large trees are burnt and the wood ashes spread the field with a view to rejuvenate the crop. The crop is raised al by transplanting the seedlings raised in separate nurseries.

There are two varieties of lemon-grass found in the growing-area The one used for distillation purposes is the red-stemmed varie which gives better quality of oil containing as much as 85 per cen of citral. The second variety, which is characterised by its whi stem and midrib, yields an inferior quality of oil with much lowe citral content. Great care has therefore to be exercised in selectin the seeds only from these red-stemmed plant for planting purpose Harvesting of the grass is done before the crop begins to flower, a otherwise the yield of oil will be poor. The grass is cut almost clos to the ground. The first cutting is made four or five months afte sowing the seeds but subsequent cuttings can be had at intervals o 40-45 days, and normally between July and December, five cuttings ar annually taken for distillation purposes. During the hot and summe months prevailing thereafter no cuttings are possible from the cro

The life of the crop varies from 5 to 8 years in each field depend ing upon its fertility and seasonal rainfall. The yield of grass is les in the first year of planting but during the second and third year the maximum yield is obtained which declines thereafter until th sixth year after which period the crop becomes uneconomical unles special attention is paid to it. On an average, however, the planta tion lasts in the field for about six years.

(ii) *Number and location of oil-distilling plants*

The total number of stills which are at present engaged in th extraction of lemon-grass oil is estimated at 2,200. Nearly 2,000 o these are distributed in Travancore-Cochin and are concentrate around Kuruppampadi in Perumbavur *taluka* which is the mai processing centre for this oil. The rest of the stills are located i the Malabar district in certain portions of Calicut, Wynad, and Tal paramba.

The stills in use are mostly of the indigenous type which vary i capacity from 8 to 18 cubic feet. The average type of country sti takes about 200 lb. of green grass at a time, and completes the disti lation in about 2½ to 3 hours. During the busy season, 3 to 4 distill tions are made in a still each day. Each of the present type of sti

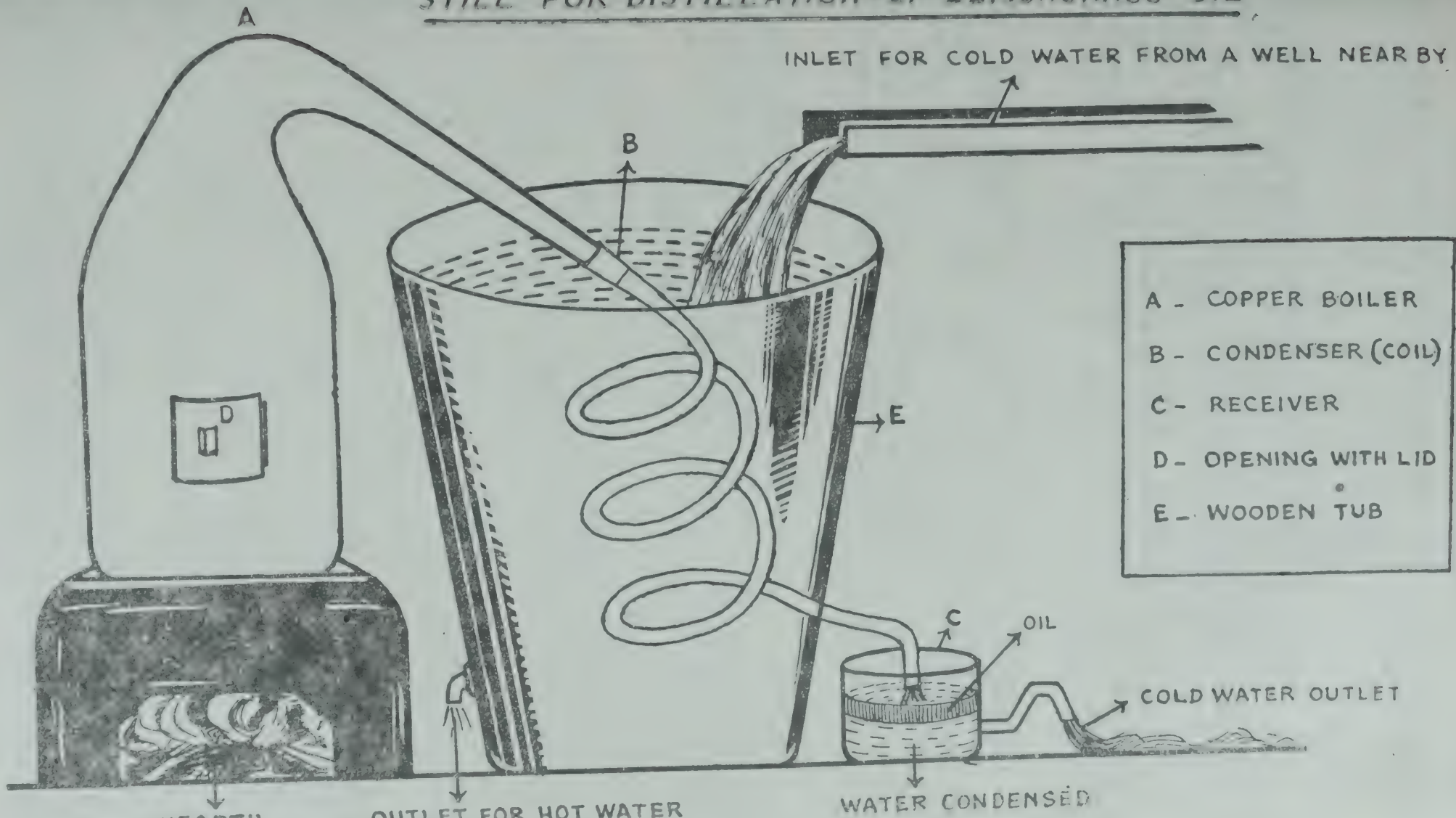


Fig. 32. Home-made country still for distillation of lemon-grass oil

of 80—90 gallons capacity costs Rs. 400 to Rs. 500 including the installation charges.

(iii) *Mechanism of distillation*

The ordinary country still used for the distillation of lemon-grass in India consists of three parts, *viz.* (1) the copper boiler-A, (2) the condenser-B and (3) the receiver-C as shown in the sketch. All these three parts are made of copper and are of local manufacture. The boiler (A) which is shaped like a retort tapering at the end is mounted on a raised hearth made of bricks or mud. Through the opening (D) on the body of the boiler, bundles of lemon-grass and water are admitted and the hole closed with a tight lid having a handle for letting in and taking out the charges. The boiler is generally made of thick copper sheets.

The condensing system (B) consists of a single copper spiral and is kept immersed in a cylindrical wooden tub (E) containing water. At the top, it is connected to the tapering end of the boiler while the bottom end projects into the receiver (C). The wooden tub in which the condenser is immersed has an open mouth through which cold water lifted from a neighbouring well is let in. It has also an opening at the side above the bottom for drawing off water as it becomes hot during the distillation process.

The receiver (C) is a small copper vessel which is fixed in the ground close to the condenser (B). The distillate collects in it in two layers, the upper layer consisting of oil and the lower layer consisting of water. On one side of the receiver just above the bottom, there is a bent tube which allows only water to flow out in small quantities leaving the oil at the bottom of the receiver.

Before starting the actual distillation, the inner sides of the boiler are cleaned. Thereafter, 300 to 450 small bundles of freshly cut lemon-grass weighing about 180-200 lb. and adequate quantity of cold water are introduced into the boiler through the opening. After introducing the charge, the lid of the boiler at (D) is placed in position and the joints plastered with cowdung and mud to prevent leakage. The hearth is then lighted by means of firewood and direct heat is applied to the boiler. As the heating proceeds, the green-grass boils in water and a mixture of water vapour and essential oil escapes through the tapering end into the condenser. As cold water is poured into the tube (E) at frequent intervals the vapours get cooled during their passage and collect inside the receiver in two separate layers, from which the water layer separates out through the outlet and oil layer remains at the top. The oil is collected and stored in bottles of capacities varying from 24 to 28 oz. For export purposes, however, 40-45 gallon steel drums are used. The time taken for completing one distillation is $2\frac{1}{2}$ to 3 hours and the firewood required for the purpose amounts to one hundred weight. Three to four distillation are generally completed in a day during the busy season.

Apart from the crude design and construction of the present equipment, a lot of firewood is consumed in the process. As extraction is done on open fire, it is not possible to regulate the temperature and considerable loss of oil also occurs by evaporation. This is further

aggravated by the fact that in the present equipment, there is no proper arrangement for cooling in the condenser. Nor is the arrangement satisfactory in regard to the separation of the oil from water in the final distillate. The problem of this industry is, therefore, to improve the present type of country still and evolve a more suitable type for the extraction of oil in these areas at cheaper cost.

In evolving a better type of distillation plant, the following defects of the present equipment will have to be remedied:

(a) Wastage of fuel due to external heating

(b) Incomplete recovery of oil

(c) Deterioration in the quality of oil due to unregulated heating

(d) Improper cooling system causing wastage of oil due to over-heating

(e) Longer time for each distillation causing lower output

(f) Inefficient receiving system

(g) Formation of 'boiler-scales' inside the boiler causing its damage

Some suggestions for improvement are:

(a) Under laboratory conditions, 20 per cent increase in the yield of oil has been obtained by adopting steam distillation. The citral content of the oil obtained by steam distillation was also found to be appreciably higher. Instead of direct heating, steam distillation should be preferred.

(b) At present there is no proper arrangement for circulation of cold water with the result that there is no full recovery of oil. Continuous flow of cold water can be assured by fitting up an overhead tank.

(c) From the distillate collected in the receiver the water (the mother liquor) is allowed to drain off at present. This should not be lost as it contains traces of oil. It would be better if it is let back into the boiler.

(d) In order to prevent formation of 'boiler-scales' stainless steel is said to be better for the making of these stills instead of copper.

(iv) *Yield of oil and economics of production*

As already stated, lemon-grass is a perennial crop and the average economic life of a plantation may be reckoned at six years. The oil content of lemon-grass leaves varies from 0·25 to 0·50 per cent, but the total recovery of oil from a plantation depends upon many factors. During the first year the yield of the oil is poor and amounts, on an average, to 1½ dozen bottles of 22 oz. each. During the second and third years, the recovery of oil is more and averages 2½ dozen bottles annually. Thereafter, the yield is reduced to two dozen bottles a

year until the sixth year. The cost of production of oil worked out on the basis of the figures supplied by the Lemon-grass Research Station, Odakkali, Travancore-Cochin is given below:—

Cost of production of lemon-grass oil (per acre)

		Rs.
(1)	Cost of cultivation during the first year	97-0-0
(2)	Cost of harvesting and extracting 1½ dozen bottles of oil during the first year	90-0-0
(3)	Cost of harvesting and extracting 2½ dozen bottles of oil during the second year	185-0-0
(4)	Cost of harvesting and extracting 2½ dozen bottles of oil during the third year	185-0-0
(5)	Cost of harvesting and extracting 2 dozen bottles of oil during the fourth year	150-0-0
(6)	——————do——————fifth year	150-0-0
(7)	——————do——————sixth year	150-0-0
	Total cost of extracting 12½ dozen bottles of oil	1007-0-0

Approximately Rs. 80 per dozen bottles of 22 oz. each.

While the cost of production amounts to Rs. 80 per dozen bottles, the present price is quoted at hardly Rs. 70. Research should, therefore, be directed in cutting down the costs to the minimum.

(v) *Total supply of lemon-grass oil*

There is no authentic record of either the actual area under lemon-grass cultivation or of the yield of oil in different producing areas. According to official sources, the total acreage under lemon-grass cultivation during 1951-52 in the main producing areas amounted to 39,863 acres which was distributed as follows:

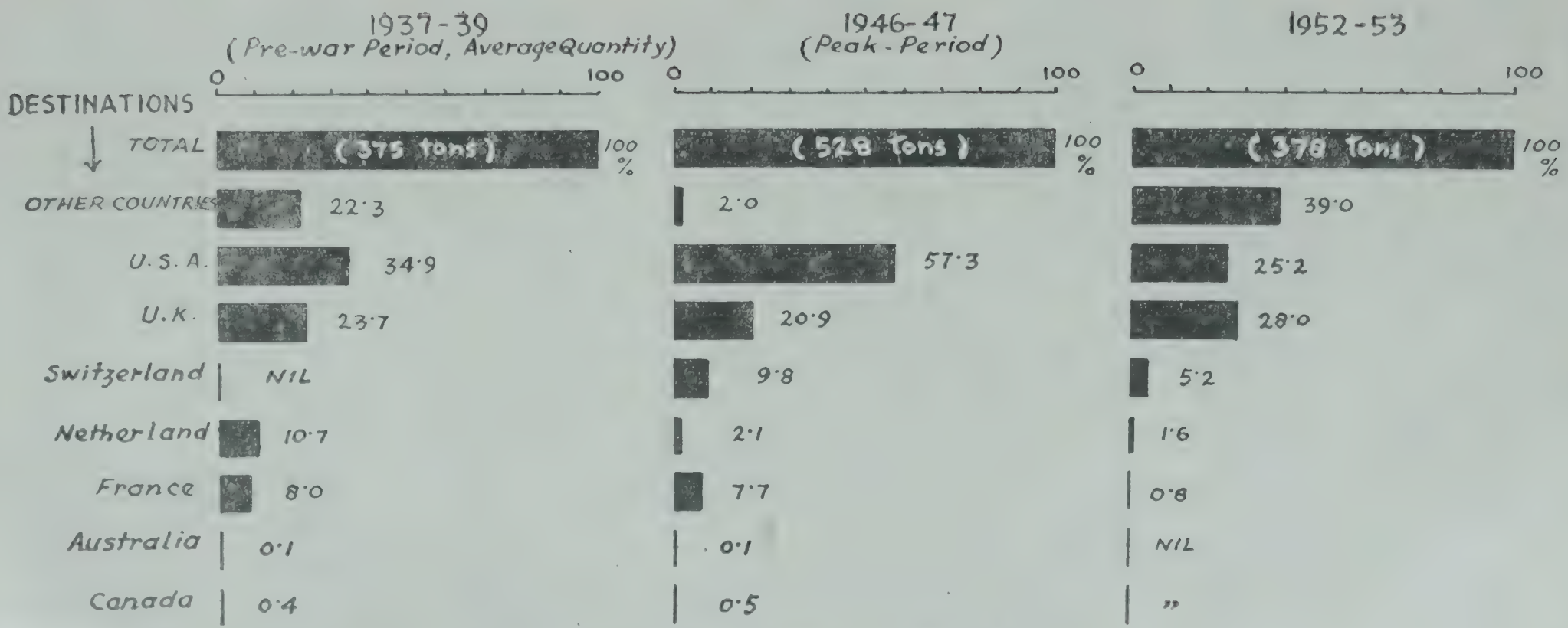
Travancore-Cochin	—	35363	acres
Malabar	—	4500	,,
Total		39,863	,, or nearly 40,000 acres

The total yield of oil obtained from this crop during 1951-52 has been estimated at 714 tons. Out of 714 tons of oil produced in India during 1951-52, 634 tons representing 87 per cent were produced in Travancore-Cochin. The quantity of oil produced in the Malabar district was small and amounted to 80 tons representing hardly 13 per cent of the total supply.

From a few tons before the war, the annual production of oil has gradually increased in recent years. The trend of production has been upward, the maximum supply obtained being in 1951-52. Due to lack of demand, distillation has not been rapid in many plantations and the total supply during 1952-53 has not gone up.

(vi) *Exports*

There are no imports of lemon-grass oil into India. This country exports this oil to the world markets under the trade name of East Indian lemon-grass oil or Cochin lemon-grass oil.



Fi . 33. Percentage export of lemon-grass oil from India to different countries of the world

The exports of this oil during 1951-52 amounted to 488 tons or 68·1 per cent of the total annual supply in the country. During world war II, large quantities of the oil were used in the U.S.A. in the synthesis of Vitamin A and in the manufacture of ionones. In recent years, there has been a lack of demand from these sources and this has resulted in appreciable decline in the exports and prices of this oil.

The U.K. is our next important customer. The demand from this source has remained more or less steady. Before the war, the U.K. took 89 tons of Cochin oil representing 23·7 per cent of the total exports. The post-war exports have declined slightly to 84 tons representing only 18·2 per cent of the annual exports from India.

Other foreign markets for this oil are Australia, Netherlands, France and other Continental countries of which France is the most important. The off-take of this country has steadily increased from 30·1 tons before the war to 42 tons during the present time (*vide* appendix XXXV). Here, the oil is used chiefly in the cosmetic and perfumery industry. Australia is a new customer for the Indian oil and the trade with this country has developed during the war. Netherlands used to import comparatively larger quantities of this oil from India before the war but the post-war figures show considerable decline. Though in small quantities, India exported this oil to Canada also. In order to improve our exchange position, the possibility for increasing trade with these countries should be explored by Indian Government Trade Representatives abroad. Cochin is the most important market for this product in India and almost the entire foreign exports take place through this port. The total value of these exports has also steadily increased. From hardly Rs. 7 lakhs worth of oil exported before the war, the total value increased and amounted to Rs. 1·49 crores in 1951-52, bulk of which was earned in dollars. During 1952-53 the quantity and value have declined (*vide* graphs).

(vii) *Quality of oil*

In the world trade, the oil of Indian origin is known by the name of East Indian lemon-grass oil or Cochin lemon-grass oil while the products obtained from other sources are known as West Indian lemon-grass oil. The quality of these oils is judged mainly by their citral-content and solubility in alcohol. In respect of both these factors, the Indian product has been found to be far superior to the West Indian product.

The citral-content of Cochin oil has been found to vary from 41 to 85 per cent by volume and more than half of the commercial samples from India have been found to have a citral-content above 65 per cent.

Though the commercial samples contain citral up to 85 per cent, the exports to foreign countries are generally of only one quality containing 75-77 per cent citral. There is, therefore, no incentive to ship oil with greater citral-content. Better quality oil is, therefore, toned down to 77 per cent citral-content with oil obtained from white grass, or even mineral oils have been used for adulteration by unscrupulous businessmen. All these reduce the solubility of the oil in alcohol and thus reduce its utility for many of its industrial

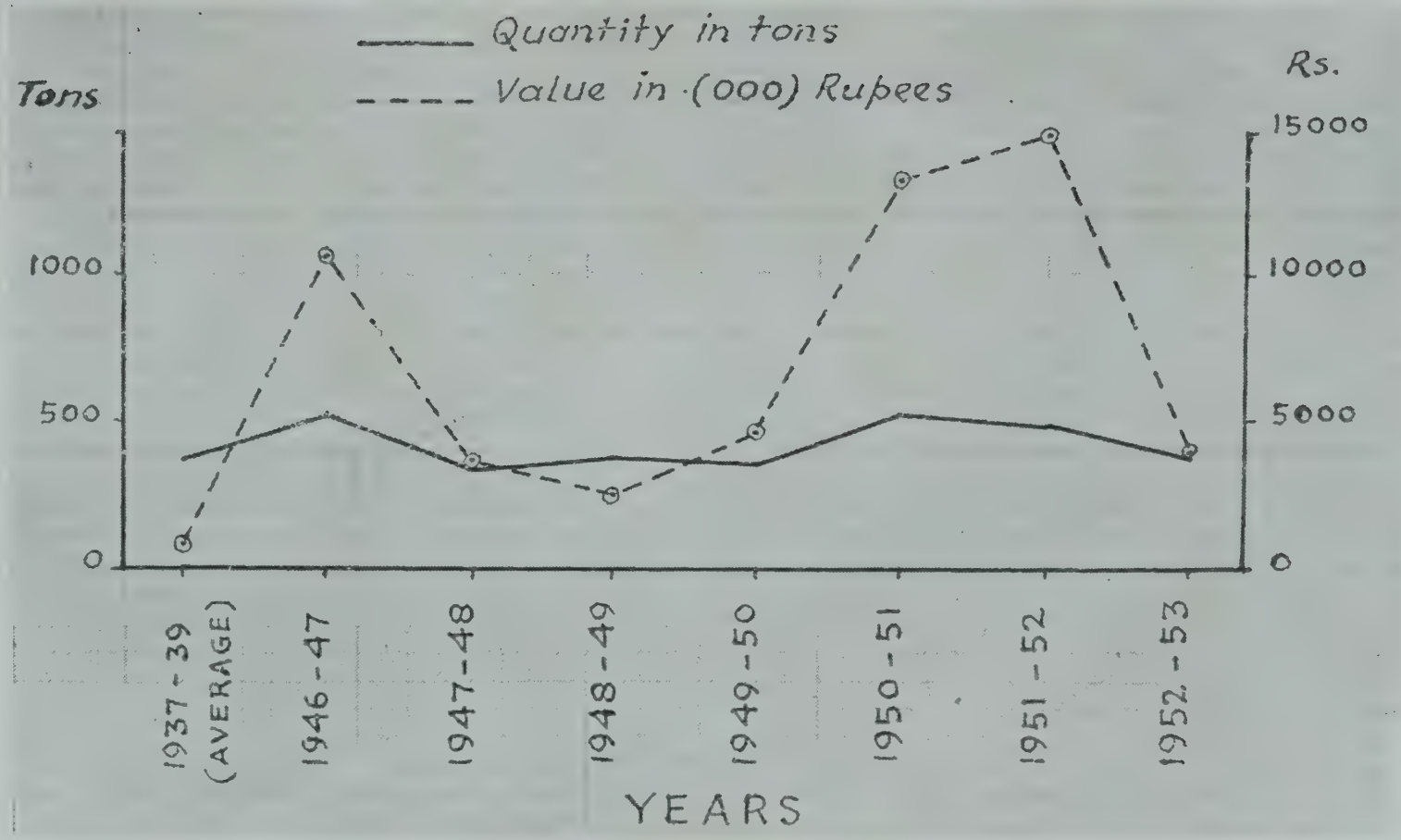


Fig. 34. The trend of export of lemon-grass oil from India

uses, particularly in the perfumery industry. Considering the competition from other sources and the present decline in the world markets for this product, we should take early steps to gain the confidence of our foreign customers by firmly establishing the reputation of our product by means of proper quality control.

The Indian Standards Institution has framed the following draft specifications for Indian lemon-grass oil:

General. It shall be a clear liquid and free from sediment, suspended matter, separated water and added adulterants.

Solubility. Unless otherwise agreed between the purchaser and the seller, lemon-grass oil shall be soluble in 2-3 volumes of ethyl alcohol, 70 per cent by volume, occasionally with slight turbidity.

Colour and appearance. Reddish-yellow to brown mobile liquid.

Odour. Lemon-like.

Specific gravity	—at	15°	C. O.	900 ..	0·910
	—at	25°	C. O.	892 ..	0·902
	—at	30°	C. O.	888 ..	0·898
Optical rotation	—at	..	·3 to +	1°	
Refractive Index	—at	25°	C.	1·4876 ..	1·4846
	—at	30°	C.	1·4808 ..	1·4868

Citral-content. Minimum 75 per cent by volume.

These minimum standards should be adopted for this oil with suitable modifications under the Agricultural Produce (Grading and Marking) Act and the Central Government should prohibit the export from India of all sub-standard qualities under the provisions of the Sea Customs Act.

After extraction, the oil is generally stored in glass bottles of capacities varying from 24 to 28 oz. the standard size being only 22 oz. For export purposes, 40-45 gallon steel drums are used. While the metallic containers serve the purpose well, storage in bottles often involves deterioration in quality on account of exposure to light. This loss should be minimised by keeping the bottles in cool and shady places.

(viii) *Unit of sale*

The unit usually adopted for the sale of the Indian lemon-grass oil is a box containing one dozen bottles of oil. The capacity of the bottles varies from 24 to 28 oz. in the producing and assembling centres while in the terminal markets, the standard bottles have a uniform capacity of 22 oz. The larger measures in use in the primary markets are often manipulated against the interests of the producers. The unit of sale in all the markets should, therefore, be standardised and should consist of standard bottles of 22 oz. only.

The unit of sale should be a standard box containing one dozen bottles of 22 oz. each and weighing 16½ lb.

(ix) *Prices*

The post-war prices of Cochin oil have shown a steady increase as may be seen from Table I.

TABLE I

Average annual price of Indian lemon-grass oil per box of dozen bottles

Year	Price (Rs.)
1947-48	65
1948-49	60
1949-50	121
1950-51	216
1951-52	220
1953 (January)	70

After maintaining a steady trend at Rs. 60-65 per box of oil during 1947-48 and 1948-49, the prices increased to Rs. 121 in 1949-50. It registered further rises in the subsequent years and stood at Rs. 220 during 1951-52. The maximum price of Rs. 350 was obtained in March 1951. During the last few months, however, the prices of this oil have shown a downward trend and have fallen to Rs. 65 to 70 at the present time (*vide* appendix XXXVI).

It is clear that the present price level is unremunerative and does not cover even the cost of production of this oil which has been estimated at Rs. 80 at the Government Farm, Odakkali, Travancore-Cochin. Unless the prices improve and the producers are enabled to get at least the production costs, the industry is bound to suffer and most of the existing lemon-grass farms are likely to be neglected.

This decline in prices is largely attributed to the larger supplies of oil obtained from Guatemala during the season and also to the weak demand for this product from the manufacturing industries in the U.S.A. and other countries. As there is no immediate prospect of improvement in this price situation, it is necessary to reduce the production costs. Simultaneously, steps should be taken to increase the demand for this oil for industrial purposes within the country. Preliminary investigations carried out in Travancore-Cochin have proved that it is possible to manufacture ionones from this oil in India. Steps should, therefore, be taken to set up a pilot plant for the preparation of these synthetic products on a commercial scale within the country and encourage their utilisation in Indian industries.

Assembling and distribution

Cochin is the most important market for lemon-grass oil in India. e main assembling centre is located about 16 miles from the port Cochin at a place called Kuruppampadi by the producers themves or by the village merchants. The village merchants in the mary markets or at Kuruppampadi make purchases in small lots the basis of 24-28 oz. bottles. The merchants at Kuruppampadi nerally act as agents of the shippers at Cochin. They examine the ality of the oil with 2-3 parts of 70 per cent ethyl alcohol in which should be soluble with slight turbidity. At Kuruppampadi when equate oil is purchased, it is transferred to 40-45 gallon steel ums and transported first to the shippers at Alwaye by road and m there by boat to the Cochin port for shipment.

At Alwaye, the shippers filter the oil and determine the actual tral-content of the samples. Under the shipping contract, the porters have to guarantee a minimum citral-content of 75 per cent the sample. In order to ensure this minimum citral-content at e destination and to make allowances for the loss in transit or rage, the shippers generally keep a target of 77 per cent citral all exports. As many commercial samples contain up to nearly per cent citral-content, the shippers blend it with the oil of the hite-stemmed lemon-grass so as to bring down the citral-content the shipments to 77 per cent. This encourages adulteration with ls of inferior quality and also bring down the reputation of the dian product in the world markets. With a view to encouraging xports of better quality oils with higher citral-content, we recomend that the fair average quality of the exports should be fixed at per cent citral-content and the exporters should be given a higher emium for increase in citral-content up to 85 per cent.

The lemon-grass oil trade in India is at present in the hands of a nall number of shippers operating at Alwaye and Cochin. The nall quantity of oil produced in the Malabar district also finds its ay to Cochin and is exported through this small coterie of shippers. ost of the village merchants act as agents of these big shippers ho advance loans for the purchase of these oils on their behalf in e producing areas.

Thus between the producers and the shippers, the village merants act as middlemen whose interests are always identical with ose of the shippers'. The ignorance of the producers who bring ly small quantities of oil for sale and the differences in the capacity bottles used for buying and selling are often used in manipulating e prices paid to the producers. Standardisation of the units for rchase and sale and other market practices under the Regulation Market Act will go a long way in remedying these defects in the ternal marketing system.

3. Research, technology and development

Considering the important lemon-grass oil industry for the State, e Government of Travancore-Cochin have started a Lemon-grass esearch Station at Odakkali. Though necessary land has been cquired and the officer-in-charge has been appointed, the Farm has ot been brought into working condition for conducting botanical,

chemical and agronomic studies. The authorities of the States co cerned have not also made any progress in improving the efficien of the existing types of country stills.

Under the Essential Oil Development Scheme, the Government Travancore-Cochin have already carried out preliminary investig tions regarding the possibilities of ionone manufacture in India. T utilisation of this oil in the manufacture of other synthetic produc however, requires further research and experimentation.

4. Summary of conclusions and recommendations

(i) *General outlook*

Although India is the largest supplier of lemon-grass oil in th world markets, the total demand for this Indian product has decline since last year. This is attributed partly to larger supplies receive from Guatemala and partly to the curtailment of demand from th manufacturers in America and other foreign countries. Unless step are taken to find alternative uses for this oil in India, the prospec of this Indian industry are not bright.

(ii) *Commercial manufacture of ionones*

Lemon-grass is a basic raw material for the manufacture of man aromatic substances which are used in the perfume, soap and cosmeti industries. Preliminary investigations carried out by the Govern ment of Travancore-Cochin have shown the possibility of utilisin Indian lemon-grass oil in the manufacture of ionones and in th synthesis of vitamin A. A pilot plant should, therefore, be set up i this State and early arrangements made for the commercial manu facture of ionones and other products. The Central Governmen should subsidise this project and encourage the use of these manu factured products in the Indian industries.

(iii) *Adequate supply of red-stemmed grass seeds*

The cultivation of lemon-grass is simple and presents no difficult but in most of the fields the cultivated variety of red stemmed gras is often found mixed with a white-stemmed variety which yields a inferior quality of oil. In order to prevent such admixtures, ade quate arrangements should be made for the supply of sufficien quantities of seeds of the red-stemmed grass. The Lemon-gras Research Station at Odakkali, Travancore-Cochin which has facilitie for the cultivation of this grass, could be entrusted with arrange ments in this connection.

(iv) *Need for improved type of country still*

The present type of country stills used in India for the distillatio of oil are crude in design and construction and involve considerabl wastage. It has been found that by adopting steam distillation bot the total recovery and the quality of the oil could be increased b about 20 per cent. In order to reduce the costs of extraction and t improve the quality, there is need for evolving an improved type c equipment in the producing areas for the distillation of oil fro lemon-grass. The governments of Travancore-Cochin and Madra

d the Central Government should take early steps in this direction d arrange to supply improved type of stills to the producers on a bsidised basis.

) *Mutual allowances for quality of oil*

Although Indian lemon-grass oil contains up to 85 per cent citral, e shippers are asked to guarantee only a minimum of 75 per cent ;ral-content in their consignments under the present shipping con- act terms. This provision encourages adulteration and also un- :cessarily brings down the reputation of the Indian product. The oducers are also not able to realise the premium for better quality their products. The trade contract terms should, therefore, be ıended so as to guarantee a minimum citral-content of 75 per nt and provide for payment of premium for any higher citral- ntent above 75 per cent. The Indian Standards Institution has escribed minimum standards of quality for Indian lemon-grass oil. ıese standards should be suitably amended under the Agricultural oduce (Grading and Marking) Act so as to provide mutual allow- ıces for quality as stated above on the basis of citral-content.

vi) *Preventing export of sub-standard qualities*

Necessary arrangements should also be made to prevent the export sub-standard qualities for India under the provisions of the Central ea Customs Act.

vii) *Cooperative marketing*

The extraction and marketing of the oil is all done by a small umber of producers. Greater economies could be effected in ıstallation charges and manufacturing costs if they could combine ıemselves into cooperative marketing societies.

Such societies should own laboratories for the regular testing of e oil and its correct determination of citral-content and other ıality factors. Necessary facilities should be given by the Govern- ents at the Centre and the States in organising such cooperatives.

viii) *Uniform weights and measures*

The weights and measures used in the marketing of lemon-grass l in the primary and terminal markets are not uniform. A bottle ı the primary markets contain 24 to 28 oz. of oil while in the termi- al markets, the capacity of the bottle is uniformly 22 oz. As this ystem often causes confusion and hardship to the producers, arrange- ıents should be made to adopt uniform weights and measures and lso to regulate the marketing of this product under the Regulated Markets Act.

ix) *Maintenance of statistics*

Reliable statistics of acreage under lemon-grass or of the supply f oil are not available in the different producing States. The Governments of Travancore-Cochin and Madras which are the most mportant producers of this oil should arrange to collect this informa- ion and regularly publish it in their season and crop reports.

(x) *Market-news service*

Very little reliable information regarding supply, stocks, dema and prices of this oil filters down from the exporters to the produce in the village markets. The need for such commercial intelligen exists greatly in Travancore-Cochin and Malabar. The Governmer of the respective States should arrange to disseminate such ne regularly in the rural markets through bulletins and broadcasts fro regional stations of the All India Radio.

(xi) *Organisation for development*

The central and regional committees for spices proposed in the ca of pepper should function also for carrying out the various measure which we have recommended for developing the lemon-grass o industry in India.

APPENDICES

I to XXXVI

APPENDIX I

India's dollar-earnings from exports of spices and other cash crops during the triennium ending 1952-53

(value of exports in lakhs of rupees)

Value of foreign exports (1)	Pepper (2)	Cardamom (3)	Ginger (4)	Turmeric (5)	Cashew kernels (6)	Lemongrass oil (7)	Total value of exports (8) (Col. 2 to 7)
In hard currency	13,14	7	..	10	7,89	38	21,58
In soft currency	6,72	1,52	76·5	81	2,22	69	12,72
Total value	19,86	1,59	76·5	91	10,11	1,07	34,30
Percentage of the value earned as dollar	66	4·4	..	10	78	35·5	62·9

Source : —Accounts relating to the Foreign (Sea, Air & Land) Trade and Navigation of India—March, 1953.

APPENDIX II

Questionnaire sent by the Spices Enquiry Committee

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

Enquiry Form

Please return to the Secretary, Indian Council of Agricultural Research, Jamnagar House Hutments, New Delhi.)

Name of informant.....

Address.....

Date.....

Name of commodity.....

(Separate form to be used for each commodity)

QUESTION

I.—PRODUCTION.

(1) What is the area under the crops in your State?

(2) What is the annual production of the crop?

(3) What are the conditions suitable for cultivation?

E.G., (*a*) Soil, (*b*) Climate, (*c*) Rainfall, etc.

(4) What is the average area under the crop for cultivator?

(*i*) Is this crop being grown on plantations basis in your State? If so state the percentage area under the different sizes of plantation, *i.e.*, below 1 acre; below 1 to 3 acres; below 3 to 5 acres; below 5 to 10 acres, above 10 acres.

(5) Does the present tenancy law and practice in your State hinder extension of cultivation of the crop? If so, how and in what manner?

(6) How are seed and planting material obtained? More particularly with reference to the type, quality and cost?

(7) What arrangements exist for supply of plants and planting material for cultivators?

(8) Is there any arrangement to see whether seeds and planting materials are free from diseases?

(9) What are the important pests and diseases of the crop?

(10) What are the arrangements to see from time to time that plantations are free from pests and diseases?

(11) What arrangements exist to control pests and diseases?

(12) Is there any loss by pilferage? If so, what is the approximate expenditure?

(13) What steps in your opinion are necessary to avoid the pilferage? Does pilferage affect the quality of the marked produce? If so, how?

(14) Are the seeds used indigenous or exotic? If exotic, from which countries are they imported and in what quantities annually?

I.—CULTURAL PRACTICES.

(15) What are the important cultural practices adopted for proper cultivation. *E.G.*, Preparation of land, seed rate, distances between rows, etc.

(16) What manure is commonly used?

(17) Is it available in sufficient quantities?

(18) If not, what measures do you suggest for obtaining adequate quantities of manure?

(19) Are chemical fertilisers used to step up production? If so, what is the average rate per acre and what percentage of the total area under the crop which is so manured?

II.—IRRIGATION.

(20) Does the crop entirely depend on annual rainfall?

(21) Is the present rainfall sufficient for cultivation?

(22) Are irrigation facilities besides, rainfall, needed for stepping up production? If so, what are your suggestions of practical possibilities?

(23) Please indicate possibilities of increasing:—

(*a*) Area, (*b*) Yield per acre.

(24) Please give reasons why available additional area, if any, has not been utilised for increased production.

(25) How can yield per acre be increased and what are the present difficulties?

(26) Has any research been undertaken to increase the yield per acre?

V.—MARKETING.

(27) What is the stage at which crop is harvested, *i.e.*, mature or immature?

(28) Is there any tendency to harvest immature crop on account of economic or other factors?

(29) Are any malpractices employed by farmers? *E.G.*, Adulteration before selling.

(30) What is the nature and extent of such malpractices?

(31) What is the method employed for processing before marketing and cost of processing for Bengal maund (82 lbs.)?

(32) Is it in your opinion high and can it be reduced? If so, how?

(33) Are packing materials available in the country? What is the cost of packing?

(34) Indicate the quality of packing material imported from abroad and its approximate value per annum.

(35) How does the farmer sell his produce?

(36) Please indicate the methods of price fixation at the time the farmer sells his produce.

(37) Is there a monopoly or is there any syndicate for the produce? If so explain its nature, advantages and disadvantages.

(38) Compare farmer's price with prices prevailing in key markets like Bombay and Alleppy for the same quality of goods.

(39) Are there any malpractices in the villages in regard to weighing brokerage, commission, charity, etc.? If so, explain them.

(40) What are the malpractices exercised by traders ?

(41) Please indicate briefly the stages through which the goods pass from the farmer till they reach the final exporter or consumer. Indicate the price at each stage with reference to standard unit 82·2/7 lbs

V.—GRADING AND STANDARDISATION.

(42) What are the factors which determine qualities for (*i*) internal consumption, and (*ii*) export in respect of demand for different purposes, *e.g.*, as spice, for medicinal purposes, for table and other purposes, etc.

(43) Please describe in brief the practices followed by the producers, merchants and exporters in the grading of the produce.

(44) Are there any private or trade standards or conventions regarding quality? If so, describe in brief.

(45) In what manner such private standards or conventions are effectively enforced ?

(46) Is the crop graded under the Agricultural Produce (Grading and Marketing) Act, 1937 ?

(47) What would be advantages and difficulties in grading the crop on the basis of all-India standards of quality ?

(48) State the desirability or otherwise of regulating quality of exports on the basis of standards.

(49) Can we effectively regulate quality control by entrusting it to the trade ? If so, how ?

(50) Would export quality regulation result in improving the export trade and reducing losses ?

(51) Are there any standard contract terms under which business is done in the produce ? If so, give details and state how and to what extent such terms are enforced ?

(52) What are your views about the introduction of standards of market or business practices in the primary, terminal and export markets ?

VI.—EXPORTS.

(53) Which are the principal foreign countries which at present import our produce ?

(54) Are there any complaints of foreign buyers regarding quality, absence of grading, adulteration, etc. ? If so, please state the nature and extent of those complaints.

(55) What are your suggestions for meeting these complaints ?

VII.—TRANSPORT AND STORAGE.

(56) What are the modes of communication and transport between villages and assembling markets ?

(57) What is their condition during the marketing and other seasons ?

(58) What is tne cost of transport per Bengal Maund of 82·2/7 lbs. per mile by road and by water?

(59) Do delays and losses occur on account of transport difficulties? If so, please state the nature and extent?

(60) What are the storing arrangements for the produce in—

(*i*) villages, (*ii*) principal assembling markets, and (*iii*) port towns? Indicate the methods and cost of financing storing.

(61) Would it be feasible to organise statutory licensed warehouses for facilitating market finance?

VIII.—FINANCE.

(62) Is the individual grower in need of finance to undertake cultivation?

(63) If so, how does he arrange for credit? Could you indicate the cost of credit from private sources and co-operative societies? What are the other advantages and disadvantages between the two credit facilities?

IX.—CO-OPERATIVE MARKETING.

(64) What is the number of co-operative marketing societies which deal in the produce?

(65) Please indicate the progress of co-operative marketing in the produce during the 5 years ending 1950-51.

(66) What are the principal difficulties in extending co-operative marketing and what remedies you would suggest?

X.—MISCELLANEOUS.

(67) Is there any machinery or organisation for promoting marketing improvements including co-operative marketing and for the collection and dissemination of marketing statistics and information?

(68) If so, are you satisfied with the working of this machinery? If not, what are your suggestions?

(69) What are the principal by-products obtained in the production and processing of the crop and what is the volume of production of these by-products?

(70) Please give suggestions for improving the production, processing, quality standards and marketing of these by-products.

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

Enquiry Form

(Supplementary Question)

(Please return to the Secretary, Indian Council of Agricultural Research, Jamnagar House Hutments, New Delhi, along with the original Enquiry Form. Those who have already sent their replies to the original Enquiry Form may plesae furnish answer to this only.)

Name of informant.....

Address.....

Date.....

Name of commodity.....

(Separate form to be used for each commodity)

QUESTION

Under Question No. 5.

If you are aware of any particular regions where the cultivation can be extended or newly introduced, please mention them.

Would you suggest that the Forest Departments in the States may be asked to include these (cashew and pepper especially) in their planting programme in the State forests?

Would you advise mixed cropping for some of these, such as the growing of lemon-grass in among cashew plantations, or among trees or other standards on which pepper may be growing.

Under Question No. 6.

Please state the names of varieties of which you may have practical experience, which may possess outstanding characteristics such as high yield, earliness, freedom from diseases, oil outturn, quality of produce and so on. Please state also the centres from where planting material of these varieties can be obtained.

Would you suggest that nurseries should be started in a number of centres by Government for the supply of seed or planting material to growers, as is being done now for Cocoanuts, or/and by subsidised private nurseries to be run under the supervision of Government Officers.

In the case of cardamoms would you prefer the planting of rhyzomes to that of seedlings, and if so what arrangements would you suggest for the supply.

Under Question No. 9.

In each case please estimate the money value of the loss, if possible. Please describe the methods of control recommended by the Agricultural departments (or in local usage) which you may have tried, and state the results. If they have been effective and worthy of general adoption, please state what difficulties, if any, prevent such adoption.

What diseases or pests are the most serious and require scientific investigation?

Under Question No. 11.

Are any manurial experiments being conducted at peresent? If not, on what basis are you fixing your manure doses? Would you recommend the laying out of a number of manurial experiment centres on private estates in addition to those on Government farms.

Under Question No. 27.

Is machinery of any kind being used in the cultivation at any stage, from preparing the field to gathering the crop, and conversion of the same into the form in which it is usually marketed? Have you found them satisfactory enough to be recommended for wider adoption? For which particular processes do you consider that there is scope and need for the use of machinery under present conditions?

Under Question No. 28.

What provision exists at present for scientific research and experiment, on the various aspects of production and processing; if you consider them inadequate, please state in what respects and suggest improvements.

Under Question No. 31.

In the case of cardamoms, what method would you suggest for enabling small producers to dry and cure the crop in efficient driers? Would you advise (1) co-operative driers at convenient centres, (2) sale of green (undried) cardamoms to the larger producers owning efficient modern driers, in the same way as tea-leaves are sold to factories.

Do you bleach your cardamoms before sale? If so please describe the method. Would you make the practice general as a means of getting enhanced prices.

As the export of cardamoms to the U.S.A. (1948-49) amounts to a mere 10 cwts. out of a total export of 17,506 cwts, can you suggest any measures for increasing this quantity, so as to materially enhance its dollar-earning capacity.

In the case of cashewnuts, is the 'Vitapack' method of export packing known in all the cashew-growing tracts, and especially in the east coast production tracts? Has any attempt been made to introduce it there? Do you consider it would be worth while to do so?

Are you adopting only the open pan roasting method of preparing the nuts or using any improved method? In the latter case please describe it and state if you would advise its general adoption.

Has the new patented method now being advertised for shelling the nuts by machinery been tried by you or any one you know of, and has it been found satisfactory?

Has the cashew "apple" been put to any large-scale commercial use? What is your opinion about the scope and prospects of any such venture?

Under Question No. 60.

Does the produce deteriorate in any manner in storage? Are there any storage pests, and what remedies are applied? What is the maximum period during which storage can be made, without any deterioration?

Under Question No. 66.

Do these societies pay advances on estimated produce or pay only after produce is actually delivered? In the former case, how do they guard themselves against loss due to (1) member failing to market his produce through the society, (2) a steep fall in prices in the interval. Would you suggest that in the case of all produce-selling societies such dues should be collected like arrears of land revenue by the Government?

In view of possible low prices due to over-production as the result of the present stimulus of soaring prices, and to a return to normal times, would you suggest the constitution of a Marketing Board for some of these products, somewhat on the lines of the Coffee Marketing Board, which will prevent a steep fall of prices, and at the same time will protect their interests of consumers. Please give your views for or against.

APPENDIX III

World trade in pepper before and after World War II

Trading countries	Quantity (in tons)							
	1937	1938	1939	Average pre-war	1949	1950	1951	Average post-war
Exports from :								
Indonesia	30,550	53,650	68,550	50,917	2,700	6,800	3,100	4,200
India	1,200	700	1,200	1,033	15,250	15,400	14,850	15,167
Others								
Total including re-exports	49,700	73,150	98,500	73,783	25,150	28,750	24,100	26,000
Net Exports	37,500	62,300	77,750	59,183	20,750	24,000	20,200	21,650
Imports into :								
U.S.A. (net)	14,800	24,800	30,050	26,550	11,700	14,500	10,800	12,333
Canada (net)	750	850	115	572	800	950	800	850
U.K. (net)	3,750	2,100	2,350	2,733	1,150	1,100	1,850	1,367
Total	47,200	52,500	75,750	58,483	23,300	26,500	21,850	23,883

APPENDI

Monthly and annual normals of rainfall and rainy days in the main pepper-producing

State and district	January	February	March	April	May	June
TRAVANCORE-COCHIN						
Kottayam	0·95	0·97	2·21	5·42	9·69	25·18
	(1·4	1·5	3·4	8·2	11·0	22·2
Quilon	1·23	1·29	2·57	5·45	9·63	20·58
	(1·8	1·0	3·9	7·7	10·7	21·0
Trivandrum	1·05	0·83	1·79	4·33	5·86	9·42
	(1·8	1·3	3·2	6·5	7·2	13·6
Trichur	0·19	0·27	0·83	3·36	8·78	32·48
	(0·3	0·4	1·2	4·6	9·7	24·2
Cochin State	0·42	0·47	1·22	3·49	9·68	28·10
	(0·6	0·7	1·7	4·6	9·8	23·5
MADRAS						
Malabar	0·28	0·29	0·82	3·35	8·12	30·43
	(0·5	0·4	1·3	4·8	8·6	23·2
South Kanara	0·15	0·07	0·20	1·59	5·85	39·82
	(0·2	0·1	·04	2·4	6·3	24·7
Coorg	0·18	0.21	1·01	3·70	4·84	21·75
	(0·4	0·4	1·7	6·2	8·1	19·9
Mysore	0.14	0·20	0·52	2·44	5·16	2·52
	(0·3	0·4	0·9	4·3	7·6	5·6
BOMBAY						
North Kanara	0·07	0·06	0·20	1·12	2·91	27·23
	(0·1	0·1	0·4	2·0	3·9	20·6

***Figures in brackets represent rainy days on which 0·1 or more of rain is

acts in India

July	August	September	October	November	December	Annual
26·90	17·37	10·24	13·61	8·25	2·32	123·11
23·3	19·5	13·7	15·4	10·5	3·3	133·4)***
17·41	11·08	8·17	12·91	8·90	2·59	101·81
15·6	15·8	11·8	14·8	10·8	3·6	119·4)***
5·64	3·47	3·91	10·15	8·44	2·44	57·44
10·8	6·9	6·4	12·7	10·7	3·7	84·8)***
29·77	17·96	9·81	13 24	5·54	0·64	122·87
26·1	19·8	12·7	13·8	6·5	1·1	120·0)***
27·14	16·25	9·08	11·98	5·95	1·14	114·92
24·5	19·2	12·5	12·9	7·4	1·6	119·0)***
33·85	18·61	8·25	10·62	5·37	0·99	120·98
25·9	20·1	12·5	12·6	6·6	1·6	118·1)***
47·46	28·69	12·40	9·17	3·20	0.55	149·15
28.4	25.9	16·1	10·8	4.3	0·9	120·5)***
33·56	19·81	8·74	9·16	3·54	0·56	107·06
25·5	21·5	13·6	13·3	5·8	1·1	117·5)***
2·95	2·91	3·81	5·70	2·63	0·47	29·45
7·1	6·2	6·3	8·6	4·2	0·9	52·4)***
36·72	21·12	9.22	6·07	1·82	0·30	106·84
26·9	23·5	14·0	8·4	2·8	0·5	103·2)***

orded.

APPENDIX

Total area under black pepper (Piper nigrum) *in differen*
(are

Period	Bombay State (N. Kanara)	Coorg State	Travancore Cochin State	Madras	
				Malabar district	South Kanara district
1936-39 (Pre-war average)	2,952*	500	89,000	94,833	8,600
1946-47	2,447	488	89,000	87,949	9,100
1947-48	2,398	498	89,000	88,419	9,213
1948-49	2,346	518	89,000	89,800	9,900
1949-50	2,357	518	89,000	88,722	9,404
1950-51	2,300	518	85,768	91,600	13,000
1951-52	2,290	1,376	87,322	95,850	14,790
1952-53	2,380	1,385	84,102	1,00,000	14,800

*Includes 113 acres grown in Surat and * 80 acres in Thana

tates of the Indian Union
acres)

State		Mysore State				
Nilgiris district	Total	Chickmagalur district	Hasan district	Shimoga district	Total	Grand total
	1,03,433	159	200	54	413	1,96,299
126	97,175	167	315	292	774	1,89,884
123	97,755	163	315	295	773	1,90,424
125	99,825	100	315	290	705	1,92,394
125	98,251	150	315	292	757	1,90,883
100	1,04,700	..	3	292	295	1,93,286
110	1,10,750	..	5	292	297	2,01,945
100	1,14,900	37	10	292	339	2,03,106

APPENDIX

Chief characteristics of local varieties of pepper

Local name of variety	Tracts where commonly cultivated	Character-
		General
Kottandan	South and Central Travancore.	Good climber, yearly bearin and a heavy yielder. One o of the best varieties.
Kanaikadan	Central and North Travancore.	Good climber, yearly bearin and a heavy yielder. On of the best. Two distin sub-divisions, Valia an Cheria.
Perumkodi	Central and North Travancore.	Medium climber, yearly bearin and a good yielder.
Karivilanchi	South and Central Travancore.	Medium climber, yearly bearin and a good yielder, a goo variety favoured by cultiva tors and traders. A hardy plan allied to Kalluvalli .
Karivalli	Rani	Good climber, bears in alternat years.
Mundi	North Travancore	Medium climber, yearly bear ing and a good yielder, hardly and an early varie ty.
Munda	Central North and Travancore.	Medium climber and poor yiel der.
Arikottanadan	South and Central Travancore.	Medium climber and a good yielder.
Thulakodi	Central Travancore	Medium climber and a good yielder, yearly bearing an an early variety.
Kuthirawali	South Travancore	Medium climber, yearly bearin and a good yielder.
Kumbakodi	Central Travancore	Good climber, yearly bear ing a good yielder and late variety.
Chumala	Rani	Good climber, yearly bearin and an early variety.
Karinghakara	Central Travancore	Bold climber, a good yielde but bears only in alternat years.
Balamcotta	Kottayam, N. Malabar	Good climber, yearly bearin and a good yielder.
Kalluvalli	North Malabar	Medium climber, yearly bear ing and good yielder. A hard plant.

I

nder cultivation in India

tics		Time of flowering	Period of harvesting	Percentage of dry to green pepper
Size of leaves	Length of spikes			
14·0×8 cm.	7·0—13·5	June—July	February—March	43
14·0×6 cm.	7·5—16·5	May—June	January—February	42
13·0×7 cm.	10·5—17·5	May—June	January—February	40
12·5×8 cm.	6·0—14·0	May—June	January—February	36
16·5×10·5	11·0—19·5	May—June	December—June	40
14·0×7·5	7·0—13·5	May—June	November—December	37
11·5×7·5	6·0—14·0	May—June	December—January	36
5·0×11·75	7·5—14·0	May—June	January—February	36
3·5×8·5	6·5—12·5	April—May	October—November	34
3·5×9·25	11·0—17·0	May—June	January—February	36
3·5×9·5	8·0—14·5	May—June	February—March	34
·5×10·25	11·0—16·5	April—May	October—November	33
2·0×7·0	5·5—13·0	May—June	December—January	37
·0×11·0	12·5—19·5	May—June	January—February	38
·0×9·1	8·5—17·0	May—June	January—February	42

APPENDIX

Chief characteristics of local varieties of pepper

Local name of variety	Tracts where commonly cultivated	Characteristics
		General
Cheriakodi	North Malabar	Medium climber, bears in alternate years.
Uthirancotta	North Malabar	Good climber, vegetative runner in large numbers but a poor yielder.
Karincotta	Wynad	Good climber, yearly bearing a good yielder aad a hardy plant.
Mallisara	North Kanara	Medium climber, yeary bearing and a heavy yielder.
Doddiga	North Kanara	Medium climber and a uniform yielder.
Mettukara	North Kanara	Bold climber and a uniform yielder.

VI—(*contd.*)

under cultivation in India

Size of leave	Length of spikes	Time of flowering	Period of harvesting	Percentage of dry to green pepper
15·5×6·75	5·5—9·5	June—July	January—February	38
16·25×8·4	10·5—19·0	April—May	November—December	38
16·40×9·5	7·5—11·5	June—July	February—March	42
17·76×12·0	8·0—12·0	June—July	January—February	42
19·35×11·55	7·5—10·5	June—July	January—February	38
15·0×13·0	5·0—8·0	June—July	January—February	38

APPENDI

Quantity and value of pepper exported from India to different countries of t

Destination	Quantity in tons						
	1937-39 average	1946-47	1947-48	— 49	1949-50	1950-51	1951-5
EXPORT TO HARD CURRENCY AREAS							
U.S.A.	142	4,194	6,957	2,878	7,754	10,732	7,884
Canada	52	695	565	380	698	600	580
Others	..	114	98	..	..	..	..
TOTAL	194	5,003	7,620	3,258	8,452	11,332	8,464
EXPORT TO STERLING AND OTHER AREAS							
U.K.	41	1,727	3,875	740	3,748	1,697	2,184
U.S.S.R.	..	825	450	235	215	515	1,155
Denmark	..	83	55	N.A.	65	81	162
Western Germany	..	..	..	172	146	372	508
France	..	..	..	N.A.	42	97	341
Switzerland	..	25	57	5	282	58	17
Italy	53	30	256	588	618	253	593
Czechoslovakia	..	150	210	..	12	167	168
Syria	..	130	74	4	244	..	..
Iran	..	2	86	..	96	79	8
Egypt	..	1,156	522	209	258	116	129
Aden and dependencies.	7	141	161	34	37	42	..
Ceylon	50	8	2	..	..	..	1
Netherlands	..	208	1,148	919	..	..	..
Belgium	3	186	84	..	..	..	..
Other countries	528	1,323	2,019	888	1,416	585	1,143
TOTAL	676	5,999	8,997	3,794	7,179	4,062	6,409
GRAND TOTAL	870	11,002	16,617	7,052	15,631	15,394	14,873
SHARE OF DIFFERENT STATES							
W. Bengal	28	153	106	194	227	170	63
Bombay	57	2,099	3,581	1,949	4,977	3,667	2,228
Sind	..	118	20	..	..	..	..
Madras	785	8,632	112,910	4,909	7,574	9,397	653
Travancore-Cochin	..	..	..	..	2,854	2.160	2,189
Cochin-Port	..	..	..	..	..	..	10,240
GRAND TOTAL	870	11,002	16,617	7,052	15,631	15,394	14,873

* Source.—Accounts Relating to Foreign (Sea, Air & Land) Trade & Navigation of Indi

VII

world during 1937-39 and during 1946-47 to 1952-53

	Value in lakh rupees							
1952-53	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53
7,878	0·65	92·7	167·3	118·5	744·7	1429·7	1216·3	1051·4
587	0·25	11·9	11·7	14·3	70·0	79·2	85·5	75·5
..	..	2·5	2·0	..	..	..	..	..
8,465	0·9	107·1	181·0	132·8	814·7	1508·9	1301·8	1126·9
1,179	0·15	25·3	75·7	29·1	328·7	228·1	348·9	138·6
350	..	11·6	10·0	9·8	9·8	70·5	193·2	44·7
19	..	1·8	1·3	N.A.	6·5	10·3	26·7	37·1
236	..	..	..	6·8	9·9	51·6	77·3	27·5
249	..	..	..	N.A.	4·9	13·5	52·8	8·8
..	..	0·5	1·3	0·2	28·8	7·4	2·7	..
710	0·2	0·6	6·2	23·2	57·9	33·1	95·2	89·2
..	..	2·1	5·2	..	1·5	22·9	26·8	..
..	..	2·8	1·7	0·1	22·8	..	..	.
..	..	0·03	1·8	..	8·9	9·4	1·1	..
64	..	20·4	11·8	7·8	25·4	12·8	20·3	8·6
..	0·02	2·2	3·3	1·1	2·6	4·1	..	..
..	0·25	1·1	0·1	..	..	..	..	..
..	..	4·4	28·0	24·5	..	..	..	..
26	0·01	4·1	2·0	..	..	..	..	3·1
1013	2·14	22·5	45·9	31·6	128·1	67·7	170·3	111·3
3,846	2·76	99·4	191·1	134·3	635·8	531·4	1015·3	468·8
12,311	3·7	206·5	372·1	267·1	1450·5	2040·3	2317·1	1595·7
84	0·15	3·0	2·3	7·5	18·4	12·0	9·6	11·5
924	0·25	38·5	77·5	75·8	455·3	466·1	359·1	117·1
..	..	1·9	0·3	..	..	..	..	..
194	3·3	163·2	292·1	183·8	648·4	1269·4	104·8	22·9
1,266	..	..	..	..	328·4	292·8	242·1	153·9
9,843	..	..	..	..	..	..	1601·4	1285·6
12311	3·7	206·5	372·1	267·1	1450·5	2040·3	2317·1	1595·7

N.A.—Not available.

APPENDIX VIII

STANDARD COST, FREIGHT (AND INSURANCE) CONTRACT TERMS OF THE

AMERICAN SPICE TRADE ASSOCIATION, NEW YORK

Sold for account of M———————————————

to M ———————————————

Quantity, about ———————————————

Article ———————————————

Quality ———————————————

and in accordance with the current Standard Specifications of th American Spice Trade Association.

Price ———————————————

Shipment, direct or indirect, from———————————————

———————————————

———————————————

Terms of payment———————————————

Weights ———————————————

Tares ———————————————

Rules for standard cost, freight (and insurance) contract

1. *Disputes.*—Any question, controversy or claim whatever betwee buyer and seller, arising out of this contract, not adjusted by mutual agreemer shall be settled by arbitration in New York under the rules herein provi ed.

2. *Quantity.*—It is understood that the word " about" applied to quanti contracted for, means the nearest amount which seller should fairly ar reasonably deliver, but no excess or deficiency to be greater than 2 1/2 per ce of the gross weight if sold gross for net or the net weight, if sold with ta allowance. The aforesaid leeway of 2 1/2 per cent. shall be deemed vo whenever the contract is liquidated by payment of the difference betwe purchase and sale in lieu of delivery. Unless otherwise specified the ton sha be considered 2,240 pounds.

3. *Shipment.*—Prompt-shall mean shipment within fourteen days. T date of the Bill of Lading covering the merchandise, shall be *prima facie* ev dence of the date of shipment.

4. *Declarations.*—The name of the vessel shall be declared to the buyer by the seller before arrival of the vessel, and in no case later than two business days after the name of the vessal becomes known to the seller except when seller can show that he was prevented from making such declaration before the vessels arrival by circumstances over which he had no control. No declaration may be withdrawn or changed by seller unless he can show error in the original declaration received, by him. If the merchandise is shipped on more than one vessel, each declaration shall be treated as a separate contract. The word " afloat" shall be deemed to mean that the steamer carrying the merchandise in question shall have left the port of shipment at the date of sale.

5. *Landed Weights.*—Landed weights shall be the actual gross weights; the goods to be weighed at sellers' expense by public weighers, as soon as practicable after landing, in such lots as may be requested by buyer in writing within three days after the arrival of vessel. Extra weighing charges, if caused by buyer's request, to be for buyer's account. Slack and missing packages to be averaged on the basis of the sound portion.

6. *Tares.*—For Ceylon Cinnamon, actual shipping tares shall govern.

For all other spices, seeds and herbs, in bags or bales unless otherwise provided for, tares shall be actual average, to be ascertained by taring a certain percentage of the sound portion of each chop or invoice, as follows: 100 packages or more, 5 per cent; less than 100 packages 10 per cent but not more than five packages, such percentages to be at least the average gross weight of each chop or invoice.

In case of packing in double bags, tare of the outside bag is to be allowed to buyer and such tare shall likewise be actual average. When terms are gross for net weights, and the goods are packed in double bags, actual average tare for the outside bag shall be allowed to the buyer.

Weigher's returns of tares shall state the gross weight of every package tared.

On all spices and seeds in cases or barrels, marked tares shall govern unless proved to be wrong by a public weigher's certificate.

7. *Duties.*—All Import Duties of the U.S.A. and any U.S.A. Federal State and/or Municipal taxes shall be for account of buyer. All Export Duties, Levies and/or other taxes, if any, levied under Government order in the country of origin shall be for account of seller.

8. *Import Regulations.*—All spices, seeds, tapioca or herbs purchased under this contract shall comply with the rules and standards under which the Food and Drug Administration of the Federal Security Agency or Successor Agency or Agencies enforces the Food, Drug and Cosmetic Act of June 25, 1938, and amendments thereto, at date of signing this contract. If any such merchandise must be reconditioned to comply with these standards, the expense and loss in weight incident thereto shall be for the account of the seller; any reasonable loss in weight on re-conditioning to be considered part of the tender. Loss in weight due to reconditioning to be determined by the difference between the landed weight and weight of the released merchandise after reconditioning.

* * * * * * *

When goods are sold to be released by the Food and Drug Administration or no sale, expenses of storage, labour, cartage and insurance pending decision, shall be borne by seller if excluded and by buyer if released.

9. *Standards.*—All spices, seeds, or herbs purchased under this contract shall comply with the rules under which the Food and Drug Administration or ' the Federal Security Agency or successor agency or agencies enforces the For Drug, and Cosmetic Act of June 25, 1938 and amendments thereto in forced at the date of this contract.

In the case of Black Pepper there shall be attached to the final invoice a certificate of a chemist approved by the American Spice Trade Association showing the quality of each lot with respect to the percentages of light berries and of dust, dirt, chaff, picking and/or other extraneous matter.

Garbled Malabar Pepper shall be subject to an allowance if it contains over 1 per cent. by weight of dust, dirt, chaff, pickings or other extraneous matter, to be determined by hand picking and by sifting through a 9 1/2 roundhole sieve. The permissible percentage of light berries in Garbled Malabar Pepper shall not exceed 2 per cent.

All other Pepper shall be subject to an allowance if it contains over 2 per cent. by weight of dust, dirt, chaff, pickings, or other extraneous matter, to be determined in the same manner as outlined in the preceding paragraph, and the permissible percentage of light berries shall not exceed 3 per cent in this pepper.

Cloves must be free from mustiness and contain not more than 5 per cent. of stems, mother of cloves, and foreign, superfluous or inferior matter 7 per cent. of Khoker cloves and 16 per cent. of moisture by the Toluol mathod.

* * * * * * *

14. *Arbitration.*—The following regulations shall govern all arbitration held under this contract:

* * * * * * *

B. *Arbitrators.*—Each disputant shall appoint a disinterested member of the Association as arbitrator. If either disputant shall neglect to appoint an arbitrator within three business days after notice in writing is received by him from the other disputant of the appointment of his arbitrator, the Presiden shall appoint the other arbitrator upon a written request from wither party to the dispute. Disputants may appoint one person to act as sole arbitrator.

* * * * * * *

E. *Award.*—The award of such arbitrators and umpire or sole arbitrator shall be final and binding on both parties, unless within three business days after receipt of the award, an appeal with a fee of Sh. 150 be lodged with the Secretary of the Association by either disputant, Settlements under an arbitration award or award of the Arbitration Committee shall be made within ten days from the date of such award, and if not so settled, judgment may be entered thereon in accordance with the practice of any Court having Jurisdiction.

APPENDIX IX

Form of Contract for Pepper, Cost, Freight and Insurance (or Cost and Freight)

Issued by the General Produce Brokers Association of London, February 1948.

Contract No.

London 19 .

We have this day.....by your order and for your account upon the terms of this Contract and of the printed Rules of the General Produce Brokers' Association of London..... about.....tons (shipping weights).....at..... .....per.....Cost, Freight and Insurance net delivered weights/net shipping weights 2 per cent. tare if to United States of America.

Legal construction.—The construction, Intention and Performance of the Contract shall be governed by the law of England whatever the residence or nationality of the parties.

Arbitration.—Any dispute arising out of this Contract to be settled by Arbitration in London according to the Rules of the General Produce Broker's Association of London.

Brokerage.....per cent. Contract fulfilled or not fulfilled.

APPENDIX X

Average monthly prices of black pepper (Alleppey) at Bombay market during 1947-48 *to* 1952-53
(in rupees per standard maund)

Year	April	May	June	July	August	September	October	November	December	January	February	March	Average
1947-48	46	45	80	48	51	48	57	63	63	65	65	65	55
1948-49	79	89	95	109	116	112	..	137	..	..	..	..	105
1949-50	..	..	..	209	220	237	256	251	237	284	294	413	267
1950-51	434	385	427	483	492	497	483	507	518	525	511	453	476
1951-52	462	448	490	490	532	..	560	490	458	458	400	251	458
1952-53	342	301	..	..	..	..	493	..	..	..	..	..	379

Source.—Marketing Research Officer, Bombay.

Average monthly prices (... of ...alicut) at Bombay during 1947-48 to 1952-53

(in rupees per standard maund)

Year	April	May	June	July	August	September	October	November	December	January	February	March	Average
1947-48	46	45	50	49	51	..	..	..	..	63	62	62	54
1948-49	78	79	95	109	..	..	..	137	97	95	104	104	100
1949-50	104	133	161	209	218	237	..	251	237	284	294	413	231
1950-51	434	385	427	483	489	505	497	520	545	455	511	441	474
1951-52	462	448	490	490	..	..	..	490	..	516	400	251	443
1952-53	437	301	430	445	464	452	462	423	357	308	323	409	401

Source.—Marketing Research Officer, Bombay.

APPENDIX XII

Average monthly prices of black pepper at Cochin market during 1947-48 *to* 1952-53

(*in rupees per standard maund*)

Year	April	May	June	July	August	September	October	November	December	January	February	March	Average
1937-38	16	15	13	14	14	15	14	13	12	12	13	15	
1938-39	13	13	12	12	13	13	13	13	12	12	13	13	
1939-40	12	12	12	12	11	12	12	12	14	12	12	12	
1947-48	74	68	70	71	72	75	82	92	94	110	98	108	
1948-49	116	126	134	160	181	196	216	191	165	145	149	196	
1949-50	217	215	257	331	349	368	496	368	386	423	448	459	
1950-51	478	463	470	507	528	570	492	435	478	515	570	474	
1951-52	498	489	526	522	559	509	478	472	404	393	397	312	
1952-53	306	353	419	509	456	426	472	390	349	309	360	428	

Source.—(*i*) Indian Chamber of Commerce, Cochin.

(*ii*) Directorate of Economics and Statistics.

APPENDIX XIII

*Statement showing the progress of the Malabar District Co-operative Produce Sale Society Ltd., Calicut (Kozhikode) South Malabar**

	1947-48	1948-49	1949-50	1950-51	1951-52	As on 31-12-52	Remark
Number of members	3,769	4,444	5,104	5,725	6,198	6,291	
Paid up share capital (Rs.)	97,591	1,15,230	1,34,207	1,59,415	1,76,050	1,76,857	
Loans issued (Rs.)	14,86,460	12,05,859	15,63,064	17,26,254	11,65,950	..	
Value of sales made through Society (Rs.)	14,17,040	31,79,576	27,06,966	41,51,992	31,53,155	..	
Commission earned (Rs.)	26,663	51,054	48,264	77,957	70,620	Not available.	

* This Society deals mostly in black pepper and ginger.

APPENDIX XIV

Total area under cardamom* (Elettaria cardamomum) *in different States of the Indian Union*

(*Area in acres*)

State	1937-39 (Pre-war) average	1948-49	1949-50	1950-51	1951-52
Bombay	665	1,212	1,177	1,177	619
Madras	10,238	11,382	10,901	6,399	6,399
Mysore	21,550	28,236	28,057	25,988	27,301
Travancore-Cochin	56,664	59,616	59,616	60,185	55,738
Coorg	14,640	11,357	13,901	13,901	11,908
Total	1,03,757	1,11,803	1,13,652	1,07,650	1,09,374

*Figures are provisional.

Source :—(i) Report of the Directorate of Marketing and Inspection.
(ii) Directorate of Economics and Statistics.

APPEN

Quantity and value of cardamom exported from India to different countries of the world d

Destination	Quantity (in tons)							
	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	19
EXPORTS TO HARD CURRENCY AREAS								
U.S.A.	53	29	19	16	49	34	8	
EXPORTS TO STERLING AND OTHER AREAS.								
U. K.	56	26	59	9	37	22	24	
Aden and dependencies	9	2	8	..	..	..	..	
Iraq	5	3	21	..	..	..	..	
Masket territory and Trucial Oman	1	1	5	..	..	..	..	
Saudi Arabia (other relative States).	48	34	189	203	123	151	146	1
Kuwait	..	51	82	..	..	..	..	1
Bahrein Islands	33	1	17	..	..	..	..	
Iran	16	..	17	..	..	..	..	
Ceylon	2	2	..	..	..	..	..	
Burma	19	16	16	..	..	..	..	
Strait Settlements	8	2	6	..	..	..	..	
Egypt	10	9	10	..	..	..	..	
South Africa	6	26	..	..	..	..	..	
Kenya Colony	3	7	10	..	..	..	..	
Anglo Egyptian Sudan	3	19	14	..	..	..	..	
Sweden	144	294	438	214	128	140	73	1
Other foreign countries	156	139	129	434	480	276	419	3
Total	572	632	1,021	860	768	589	660	9
SHARE OF								
W. Bengal	18	18	4	N. A.	N. A.	N. A.	N. A.	
Bombay	153	234	228	N. A.	N. A.	N. A.	N. A.	1
Madras	449	417	607	N. A.	N. A.	N. A.	N. A.	1
Cochin Port	..	..	..	..	..	..	..	
GRAND TOTAL	619	661	1,040	876	817	623	668	9

Source.—Accounts Relating to foreign (Sea, Air & L

N. A.—Not a

-39 and 1946-47 to 1952-53

Value in thousand rupees

37-9 rage	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53
8·4	190·6	136·4	190·4	882·1	1130·7	216·6	1152·2
1·4	161·6	236·6	93·4	733·1	621·2	666·3	802·1
9·5	5·1	44·8	..	..	..	..	..
8·7	20·4	179·3	..	..	..	..	68·0
5·4	4·0	36·2	..	..	..	..	86·6
2·5	224·6	1430·5	1855·3	2009·2	3493·5	4133·1	3446·5
.	365·7	711·5	..	..	..	..	2273·7
5·3	7·0	143·8	..	..	..	..	187·0
4·5	1·8	116·8	..	..	..	..	..
1·6	5·4	..	..	..	..	..	..
5·6	81·5	134·5	..	..	..	..	..
2·6	15·3	45·4	..	..	..	..	..
7·7	51·6	51·3	..	..	..	..	..
)·7	130·4	..	..	..	..	..	..
2·1	36·4	88·3	..	..	..	..	..
7·1	105·2	55·0	..	..	..	..	..
)·6	1849·4	3498·4	1990·8	2532·8	3739·2	2373·3	3040·3
)·4	2·3	684·2	3193·5	6360·5	5776·1	8415·9	5316·9
3·5	4002·0	7436·6	7133·0	11636·4	13630·0	15588·6	15221·1
2·4	49·6	29·9	N. A.	N. A.	N. A.	N. A.	497
0·7	1501·6	3192·5	N. A.	N. A.	N. A	N. A.	1415·4
1·4	2640·3	4347·0	N. A.	N. A.	N A	N. A.	1347·6
.	..	..	..	..	..	..	511·7
7·4	4192·6	7573·1	7323·4	12558·5	14760·7	15805·2	16373·

e & Navigation of India.

APPEN

Average monthly prices of cardamom at Man

(in rupe

Year	April	May	June	July	August	Septe
1949-50	478	478	522	522	617	
1950-51	830	771	808	838	881	
1951-52	1,117	1,117	1,073	1,058	1,058	1
1952-53	823	676	735	747	7,733	

Source.—The South Kanara Coconut and Are

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narket during 1949-50 to 1952-53

standard maund)

October	November	December	January	February	March	Average
617	720	720	970	764	830	752
999	940	999	1,014	1,175	1,117	937
1,058	970	970	940	852	911	932
676	470	441	441	456	382	603

Market Committee, Mangalore

APPENDIX XVII

(i) *Statement showing the progress of the Cardamom Grower's Co-operative Marketing Society Ltd., Saklaspur (Mysore State)*

	1948	1949	(As on 1st of July) 1950	1951	1952
	Rs.	Rs.	Rs.	Rs.	Rs.
Members	256	311	368	428	481
Shares subscribed	841	967	1,082	2,066	2,511
Share amount	7,763	8,878	10,275	19,422	23,452
FUNDS					
Reserve fund	3,360	4,331	4,825	6,262	7,397
Bad-debt fund	6,800	7,000	5,203	5,718	6,350
Building fund	265	1,927	4,126	5,884	6,352
D. E. Fund	350	450	500	700	800
LOANS OUTSTANDING					
Short term loan	1,20,801	1,23,728	2,11,282	3,79,959	3,68,859
Long term loan .	7,808	6,269	5,937	919	919
Produce loan	..	27,544	39,122	57,223	1,213
Decrees	11,495	8,679	1,857	1,552	1,552
Property	16,399	11,412	5,033	953	910
Profits	3,856	1,733	5,512	4,459	5,336 (provsional)

(ii) *Statement showing the progress of the Coorg Provincial Cardamom Co-operative Marketing Society Ltd. Mercara (Coorg State)*

	1948-49	1949-50	1950-51	1951-52	17-12-52.
Number of members	261	261	376	417	503
	Rs.	Rs.	Rs.	Rs.	Rs.
Share capital	3,723	5,687	8,145	9,010	11,210
Deposits	11,700	14,520	19,101	21,800	35,400
Loans from State Bank	9,000	15,000	18,000	10,000	13,000
Reserve fund	1,719	2,464	2,922	3,874	..
Other funds	6,497	4,503	5,224	5,858	..
Working capital	32,639	48,184	53,392	51,087	..
Advances given	67,136	173,777	210,011	216,850	248,800
Net profit	1,776	1,506	1,003	1,614	..
Stock handled (in local mds.)	3,381	3,297	1,947	1,788	3,700

Area and production of ginger (Zingiber officinale) *in different States of the Indian Union during 1948-49 to 1952-53*

States	Area (acres)					Production (in tons)					Remarks
	1948-49	1949-50	1950-51	1951-52	1952-53	1948-49	1949-50	1950-51	1951-52	1952-53	
Bilaspur	84	84	81	90	106	12	16	14	16	19	Production is expressed in terms of dry cured ginger.
Bhopal	108	127	183	231	87	39	39	65	83	31	
Bombay (*a*)	744	740	893	1,210	789	248	247	414	551	333	
Coorg	4	12	25	17	27	1	1	6	6	8	
Himachel Pradesh	2,717	1,600	1,883	2,014	2,497	1,125	1,286	1,204	973	819	
Hyderabad	682	812	1,319	1,408	877	221	277	441	470	294	
Madras	10,912	15,500	12,380	13,100	13,950	3,540	5,000	4,030	4,410	4,720	
Mysore	3	5	..	538	38	1	2	1	4	4	
Orissa	338	538	514	514	1,500	45	165	189	189	551	
P.E.P.S.U	356	371	311	576	443	176	176	130	173	138	
Punjab	56	102	40	27	16	12	46	6	4	2	
Rajasthan	..	..	113	124	123	..	..	104	52	81	
Travancore-Cochin	36,173	36,173	21,451	21,451	23,392	16,150 (*b*)	16,150	7,661	7,661 (*c*)	5,903	
U. P.	..	..	..	4,000*	..	..	..	..	2,960*	..	
Vindhya Pradesh	..	..	460	388	403	..	..	85	69	72	
West Bengal	809	852	980	1,040	1,210	422	440	500	600	600	
TOTAL	52,986	56,916	40,638	46,228	45,458	21,992	23,845	14,850	15,261	13,655	

(*a*) Provisional and hence subject to revision.

(*b*) Figures for 1949-50 have been repeated.

(*c*) Figures for 1950-51 have been repeated.

Source : Directorate of Economics and Statistics.

*Estimates of the P. M. O. (Food Grains) U. P.

APPENDI

Quantity and value of ginger exported from India

Destinations	Quantity						
	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52
EXPORT TO HARD CURRENCY AREAS							
U. S. A.	36	0.5	10	18	..	..	..
EXPORT TO STERLING AND OTHER AREAS							
U. K.	121	30	48	44	31	52	110
Aden and dependencies	958	898	1286	921	456	666	310
Iraq	15	3	13	..	..	..	..
Masket territory and Trucian Oman	8	5	..	..	..	..	..
Saudi Arabia (other native states)	376	183	594	..	351	610	595
Iran	82	7	50	..	..	..	..
Ceylon	125	29	104	..	..	..	..
Egypt	27	75	21	..	..	..	..
South Africa	17	283	..	..	..	..	..
Kenya Colony	20	27	80	..	..	..	..
Anglo Egyptian Sudan	58	307	143	..	..	..	..
Australia	18	8	3	..	..	..	..
Strait settlements	30	30	7	..	..	..	..
Other British possessions	15	5	3	..	..	..	..
New Zealand	1	10	24	..	..	..	..
Bahrin-islands	12	7	1	..	..	..	..
Zenzibar Pemba	12	4	16	..	..	..	..
Germany	150	..	..	..	..	..	..
Burma	33	23	35	..	..	..	..
Hadramaut	..	43	67	..	..	..	..
Other foreign countries	36	179	163	1078	669	865	1104
GRAND TOTAL	2120	2153	2684	2061	1507	2193	2619
SHARE OF :							
West Bengal	8	70	22	N.A.	N.A.	N.A.	N.A.
Bombay	1480	1802	1739	..	..	..	..
Sind	2	9	3	..	..	..	..
Madras	630	272	669	..	..	..	..
Travancore-Cochin	..	..	..	..	..	..	..
Cochin port	..	..	..	..	..	..	..
GRAND TOTAL	2120	2153	2684	2061	1507	2193	2619

Source : Accounts Relating to foreign (Sea, Air & land)

N. A.=Not

XIX

different countries of the world during 1937-39 *and* 1946-47 *to* 1952-53

tons	Value in thousand rupees							
1952-53	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53
..	14·1	0·6	8·2	16·8	..	..	..	..
50	70·0	36·0	50·8	54·8	75·6	208·4	267·9	90·0
1321	481·0	968·9	1146·4	1209·3	1150·8	2720·7	2506·5	2022·7
..	5·5	2·8	13·4	..	..	..	..	..
..	4·3	6·1	8·7	..	..	..	..	..
594	193·3	214·1	585·3	..	921·0	2569·7	2238·6	964·3
..	21·8	8·3	55·5	..	..	..	..	..
..	78·4	22·6	94·2	..	..	..	..	..
20	14·8	70·8	22·3	..	..	..	..	34·8
..	5·7	338·8	..	..	..	..	..	..
..	12·2	32·2	86·0	..	..	..	..	..
144	32·0	338·1	135·0	..	..	..	..	216·0
..	3·1	6·6	7·2	..	..	..	..	..
..	2·8	44·1	7·0	..	..	..	..	..
..	5·8	6·3	3·2	..	..	..	..	..
..	0·5	11·4	27·4	..	..	..	..	..
..	5·3	7·7	1·3	..	..	..	..	..
..	6·5	4·8	15·4	..	..	..	..	..
..	131·5	..	..	..	..	..	..	..
..	15·8	24·2	36·1	..	..	..	..	..
..	..	43·1	68·7	..	..	..	..	..
1147	16·0	222·0	155·0	1272·4	2023·8	3741·9	3451·0	1978·1
3217	1140·0	2414·6	2535·3	2553·4	4171·2	9240·7	8464·0	5210·9
1	2·8	77·0	24·3	N.A.	N.A.	N.A.	N.A.	1·0
338	768·3	2035·1	1688·5	N.A.	N.A.	N.A.	N.A.	538·7
..	1·2	10·6	3·2	..	..	..	..	..
271	205·6	291·8	819·3	..	..	..	..	385·5
48	..	..	..	..	..	..	..	63·3
183	..	..	..	..	..	..	..	298·6
3217	1140·0	2414·6	2535·3	2553·4	4171·1	9240·7	8464·0	5210·8

Trade & Navigation of India,
available.

APPENDIX XX

Average monthly prices of ginger (bleached) at Cochin market during 1947-48 to 1952-53

(in rupees per standard maund)

Year	April	May	June	July	August	Sept-ember	Octo-ber	Novem-ber	Decem-ber	January	Feb-ruary	March
1947-48	32	29	35	37	36	35	35	36	39	33	28	33
1948-49	34	48	44	46	55	51	57	59	57	41	61	90
1949-50	86	86	95	106	140	125	147	132	147	118	195	165
1950-51	162	158	158	191	169	176	169	180	173	115	162	154
1951-52	147	147	147	154	149	162	162	162	160	76	81	59
1952-53	62	55	53	62	66	N.A.	N.A.	N.A.	55	54	51	59

Source : (*i*) Indian Chamber of Commerce.
(*ii*) Directorate of Economics and Statistics.

APPENDIX XXI

Average monthly prices of ginger (bleached) at Bombay market during 1947-48 to 1952-53

(in rupees per standard maund)

Year	April	May	June	July	August	Sept-ember	Octo-ber	Novem-ber	Decem-ber	January	Feb-ruary	March	Average
1947-48	37	31	40	37	42	37	33	43	40	33	32	32	36
1948-49	40	48	45	49	49	49	..	62	62	68	66	87	52
1949-50	84	92	99	110	118	130	129	132	165	173	158	154	129
1950-51	158	151	191	195	193	193	189	197	187	174	165	160	179
1951-52	154	154	162	162	162	169	169	185	150	150	126	65	151
1952-53	62	60	75	84	69	68	71	68	57	56	59	64	66

Sources :—Marketing Research Officer, Bombay.

APPENDIX XXII

Average monthly prices of ginger (unbleached) at Bombay market during 1947-48 to 1952-53

(in rupees per standard maund)

Year	April	May	June	July	August	Sept-ember	Octo-ber	Novem-ber	Decem-ber	January	February	March	Average
1947-48	33	26	33	33	33	34	31	31	31	29	26	26	30
1948-49	33	40	44	44	44	44	..	51	48	57	59	81	50
1949-50	81	85	96	110	118	131	118	114	165	173	154	147	124
1950-51	151	145	176	180	179	183	178	180	179	165	163	154	169
1951-52	147	154	154	162	158	162	N. A.	N. A.	150	150	N. A.	61	144
1952-53	60	55	65	78	66	60	62	56	54	48	57	59	60

Source :—Marketing Research Officer.

Area and production of turmeric (Curcuma longa) *in different States of the Indian Union during* 1948-49 *to* 1951-52

States	Area in acres				Production in tons				Remarks
	1948-49	1949-50	1950-51	1951-52	1948-49	1949-50	1950-51	1951-52	
Bombay	8,210	10,212	10,212*	10,212	N.A.	N.A.	17,526	N.A.	Production is expressed in terms ofcured turmeric.
Madhya Pradesh	1,684	2,151	2,372	2,518	1,151	1,306	1,460	1,564	
Madras	40,573	54,125	53,685	53,685	65,500	69,800	72,300	72,300	
Orissa	32,263	35,530	37,567	43,594	23,466	25,725	25,552	29,359	
Punjab	126	126*	206	126	58	58	159	58	
West Bengal	600	600	600**	600	331	331*	331*	331	
Hyderabad	7,823	12,698	15,884	12,224	3,492	5,669	7,092	5,466	
Mysore	838	374	417	379	186	83	94	87	
Rajasthan	10	85	128	133	10	64	82	93	
Bilaspur	57	48	57	44	1	1	1	1	
Vindhya Pradesh	180*	180*	180	224	118	118	118	124	
U. P.	4,377	4,377*	4,377*	4,377	N.A.	N.A.	1,397	1,397	
Madhya Bharat	N.A.	N.A.	10	N.A.	N.A.	N.A.	3	N.A.	
Travancore-Cochin	N.A.	N.A.	4,516	N.A.	N.A.	N.A.	6,048	N.A.	
Coorg	N.A.	N.A.	7	N.A.	N.A.	N.A.	1	N.A.	
Himachal Pradesh	N.A.	N.A.	91	N.A.	N.A.	N.A.	16	N.A.	
TOTAL	92,364	116,129	130,309	123,739	94,313	103,155	132,180	109,383	

N.A.=Not available.

*=The figures for the year being not available, available data have been repeated.

**=Provisional.

Source : Directorate of Economics and Statistics.

APPENDIX XXIV

Quantity and value of turmeric exported from India to different countries of the world during 1946-47 *to* 1952-53

Destination	Quantity in tons								Value in thousand of rupees							
	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-15	1951-52	1952-53
EXPORT TO HARD CURRENCY AREAS																
U. S. A.	172	665	315	545	731	976	382	616	40·3	536·1	339·3	638·4	1275·4	1900·6	566·2	633·0
Canada	19	31	39	...	...	...	...	...	3·4	21·1	37·1	...	...	...	...	...
EXPORT TO STERLING AND OTHER AREAS																
U. K.	236	92	229	503	578	347	424	281	85·8	68·7	297·4	546·4	675·7	375·5	401·9	161·0
Aden and dependencies	182	56	3	...	...	...	...	91	446·3	26·2	2·3	...	...	...	...	53·9
Iraq	89	18	16	...	...	...	...	...	32·4	9·1	19·6	...	...	...	...	...
Masket Territory and Trucial Oman	81	47	37	...	...	...	...	...	23·5	30·6	39·7	...	...	...	...	...
Saudi Arabia	118	12	9	...	...	...	...	58	42·6	7·3	9·8	...	...	...	...	29·2
Kuwait	...	1	36	...	207	871	256	376	...	0·5	41·4	...	251·7	1024·5	203·6	00·
Behrin Island	35	17	13	...	...	...	...	...	14·1	12·5	15·2	...	...	...	...	...
Iran	478	...	110	1105	1097	1287	974	403	152·7	0·2	130·4	1322·3	1435·9	1363·3	829·0	193·
Ceylon	639	363	792	703	833	918	858	891	167·5	339·9	678·5	738·3	898·8	847·6	621·0	442·
Burma	85	1154	656	...	...	...	...	...	23·1	885·6	683·1	...	...	...	...	...
Strait Settlement	376	143	229	...	...	...	...	...	83·5	125·5	255·0	...	...	...	...	...
South Africa	220	752	...	...	...	...	...	...	72·5	539·8	...	...	...	...	...	...
Kenya Colony	53	97	85	...	...	...	...	...	18·5	67·4	101·6	...	...	...	...	...
Tanganyika Territory	27	17	32	...	...	...	...	...	9·6	15·7	36·9	...	...	...	...	...
Australia	33	12	33	...	...	...	...	...	5·7	8·7	33·4	...	...	...	...	...

Eastern	...														
Other foreign countries	402	368·02	137·03	2100	2204	3536	3723	3654	500·3						
Grand Total	3643	4164	3052	7552	8643	10280	10585	7630	1011·7	3214·6	3243·1	8427·2	11022·1	12583·2	10026·0	4669·8
SHARE OF PORTS :															
W. Bengal	186	1231	513	N.A.	N.A.	N.A.	N.A.	64	38·7	873·3	524·3	N.A.	N.A.	N.A.	N.A.	42·7
Bombay	1876	1646	1042	,,	,,	,,	,,	...	602·5	1269·3	1179·6	,,	,,	,,	,,	...
Madras	1567	1217	1496	,,	,,	,,	,,	514	366·8	1033·3	1538·7	,,	,,	,,	,,	318·7
T. Cochin	... *	...	...	...	...	...	...	70	...	...	...	...	...	...	...	85·1
Cochin port	...	...	...	...	...	...	...	711	...	...	...	...	...	...	...	441·4
GRAND TOTAL	3643	4164	3052	7552	8643	10280	10585	7630	1101·7	3214·6	3243·1	8427·2	11022·1	12583·2	10026·0	4669·8

Source : Accounts Relating to foreign (Sea, Air and land) Trade & Navigation of India.

* Western Pakistan only.

N. A. —Not available.

APPENDIX XXV

Average monthly prices of turmeric at Calcutta market during 1939-40 and 1946-47 to 1952-53
(*in rupees per standard maund*)

Year	April	May	June	July	August	Sep.	Oct.	Nov.	Dec.	January	February	March	Average
1939-40	12	13	12	11	13	14	13	14	16	14	13	13	13
1946-47	20	25	27	28	30	29	32	32	32	36	37	36	30
1947-48	40	37	37	37	38	39	37	38	38	39	46	48	39
1948-49	46	47	44	44	45	45	46	46	46	45	45	46	45
1949-50	49	48	49	48	48	48	48	48	49	49	46	47	48
1950-51	45	45	45	46	46	46	45	48	48	43	43	43	45
1951-52	46	45	44	32	25	24	24	24	22	23	21	23	29
1952-53	22	23	N.A.	23	23	28	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	21

Source : (*i*) Calcutta Price Current.
(*ii*) Directorate of Economics & Statistics.

(in rupees per standard mauna)

Year	April	May	June	July	August	Sep.	Oct.	Nov.	Dec.	January	February	March	Average
1949-50	46	46	42	42	44	44	44	40	45	46	48	46	44
1950-51	N.A.	44	46	50	50	50	48	48	46	50	48	43	48
1951-52	50	50	50	35	35	35	35	35	35	35	35	28	38
1952-53	28	28	28	28	25	21	19	19	20	20	22	27	24

Source—Directorate of Economics & Statistics.
N.A.—Not available.

APPENDIX XXVII

Average monthly prices of turmeric at Vizagapatam market during 1939-40 & 1946-47 *to* 1952-53

(*in rupees per standard maund*)

Year	April	May	June	July	August	September	October	November	December	January	February	March	Average
1939-40	N.A	N.A.	N.A.	N.A.	N.A.	12	12	12	13	14	12	12	12
1946-47	21	22	22	26	30	34	35	35	35	38	34	38	31
1947-48	36	37	35	37	35	36	36	40	38	N.A.	37	35	36
1948-49	29	31	32	34	44	44	44	44	50	55	48	46	42
1949-50	..	..	..	..	..	..	..	..	..	44	41	44	43
1950-51	42	44	44	43	47	46	42	37	35	34	36	38	41
1951-52	37	37	34	31	31	31	31	29	26	29	29	29	31
1952-53	29	28	24	24	26	33	33	33	26	27	..	..	28

Sources (*i*) Fort St. George Gazette.

(*ii*) Montly Digest of Economics & Statistics-Madras State.

N.A.=Not available.

APPENDIX XXVIII

Average monthly prices of turmeric at Cochin market during 1947-48 *to* 1952-53
(in rupees per standard maund)

Year	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1947-48	38	39	39	38	37	37	37	38	39	39	40	39
1948-49	44	51	51	45	48	44	46	48	49	51	47	51
1949-50	56	56	57	56	56	55	55	67	80	92	108	107
1950-51	85	81	80	73	73	73	73	85	92	97	100	79
1951-52	74	70	66	66	66	66	66	75	69	66	37	18
1952-53	18	19	18	18	20	20	20	18	59	51	19	19

Source : (*i*) Indian Chamber of Commerce, Cochin.
(*ii*) Directorate of Economics and Statistics.

APPENDIX XXIX

Quantity and value of cashewnuts imported into India from different countries of the world during 1937-39 *and* 1946-47 *to* 1952-53

Source	Quantity in tons								Value in thousand rupees							
	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53
Union of S. Africa	3,011	...	...	N.A.	N.A.	N.A.	N.A.	N.A.	401·3	0·4	...	N.A.	N.A.	N.A.	N.A.	N.A.
Tanganyika Territory	60	1,535	802	N.A.	N.A.	N.A.	N.A.	N.A.	6·9	591·4	251·1	N.A.	N.A.	N.A.	N.A.	N.A.
Portugease East Africa	13,131	28,677	33,412	N.A.	N.A.	N.A.	N.A.	N.A.	1707·3	11161·1	11480·2	N.A.	N.A.	N.A.	N.A.	N.A.
Zanzibar Pemba	60	...	110	N.A.	N.A.	N.A.	N.A.	N.A.	7·1	...	33·0	N.A.	N.A.	N.A.	N.A.	N.A.
Kenya Colony	390	96	262	N.A.	N.A.	N.A.	N.A.	N.A.	50·3	33·6	94·7	N.A.	N.A.	N.A.	N.A.	N.A.
Ceylon	...	741		N.A.	N.A.	N.A.	N.A.	N.A.	...	279·8	1·3	N.A.	N.A.	N.A.	N.A.	N.A.
U. S. A.	...	...		N.A.	N.A.	N.A.	N.A.	N.A.	...	...	18·6	N.A.	N.A.	N.A.	N.A.	N.A.
Other foreign countries	32	...	...	N.A.	N.A.	N.A.	N.A.	N.A.	3·1	...	...	N.A.	N.A.	N.A.	N.A.	N.A.
Total	15,163	31,049	34,596	42,827	53,351	53,956	42,353	51,682	1973·4	12063·3	11879·0	15302·4	21598·5	28455·7	32760·3	46583·8
SHARE OF :																
Bombay	3,277	2,670	3,125	N.A.	N.A.	N.A.	N.A.	N.A.	411·5	920·8	1097·2	N.A.	N.A.	N.A.	N.A.	N.A.
Madras	11,875	28,379	31,471	N.A.	N.A.	N.A.	N.A.	N.A.	1560·5	11142·5	10781·8	N.A.	N.A.	N.A.	N.A.	N.A.
Sind	24	...	...	N.A.	N.A.	N.A.	N.A.	N.A.	2·8	...	...	N.A.	N.A.	N.A.	N.A.	N.A.
Total	15,163	31,049	34,596	42,827	53,351	53,956	42,353	51,682	1973·4	12063·3	11879·0	15302·4	21598·5	28455·7	32760·3	46583·8

Sources : Sea-borne trade of India.

N. A.—Not available.

APPENDIX XXX

Quantity and value of cashew kernels exported from India to different countries of the world during 1937-39 *and* 1947-48 *to* 1952-53

Destination	Quantity in tons								Value in lakh rupees							
	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	952-53
EXPORT TO HARD CURRENCY AREAS.																
U. S. A.	10,892	13,172	10,961	16,455	15,136	20,515	14,429	19,381	108·5	497·2	285·7	450·9	478·1	700·4	635·7	812·8
Canada	324	670	145	285	567	339	425	953	3·3	24·3	4·0	8·5	16·9	12·7	19·7	49·3
Total	11,216	13,642	11,106	16,740	15,703	20,854	14,854	20,334	111·8	521·5	289·7	459·4	495·0	713·1	655·4	862·1
EXPORT TO STERLING AND OTHER AREAS																
U. K.	669	528	4,783	974	2,413	3,868	5,197	5·923	5·9	11·8	109·6	19·5	46·5	119·0	197·8	274·9
Australia	77	423	327	N.A.	N.A.	N.A.	N.A.	49	1,34	13·3	8·4	N.A.	N.A.	N.A.	N.A.	2·6
Newzeland	39	79	92	...	...	...	...	...	0·4	2·3	2·3	...	...	...	...	...
Straight Settlements	16	31	121	...	...	...	...	...	0·1	1·2	1·0	...	...	...	...	...
South Africa	94	83	...	...	...	...	...	...	0·9	2·1	...	...	...	...	...	...
Other foreign countries	1,006	181	211	571	857	671	864	1,111	5·2	3·9	2·2	13·6	19·2	23·0	36·3	136·8
Total	1,906	1,325	5,534	1,545	3,270	4,539	6,061	7,083	13·7	34·6	123·5	33·1	65·7	142·0	233·5	414·3
GRAND TOTAL	13,122	15,167	16,640	18,285	18,973	25,893	20,915	27,417	128·5	556·1	413·3	492·5	560·8	855·1	889·0	1276·4
SHARE OF :																
Bombay	1,010	640	724	N.A.	N.A.	N.A.	N.A.	88	8·4	20·8	6·4	N.A.	N.A.	N.A.	N.A.	3·9
W. Bengal	...	3	...	...	...	...	...	...	...	0·1	·02	...	...	...	...	...
Sind	...	3	...	...	...	...	...	...	...	0·1	...	...	...	...	...	...
Madra	12,112	14,521	15,916	...	...	...	...	915	120·1	119·6	535·0	406·9	...	...	...	41·1
T. Cochin	...	...	...	...	...	...	...	464	...	...	...	...	...	...	...	21·3
Cochin Port	...	...	...	...	...	...	...	3.967	...	...	...	...	...	...	..	170·9
GRAND TOTAL	13,122	15,167	16,640	18,285	18,973	25,393	20,915	27,4 17	128·5	556·1	413·3	492·5	560·8	855·1	889·0	1276·4

Source : Sea borne trade of India.
N. A.-Not available.

APPENDIX XXXI

Comparative food values of cashew kernels and other fruits

Name	Botanical name	Moisture Percent.	Protein Percent.	Fat (Ether Extracts Percent.	Mineral matter Percent.	Fibre Percent.	Carbohydrate Percent.	Calcium (Ca) Percent.	Phosphorus (P) Percent.	Iron (Fe) mg. Percent.	Calorific value per 100 gm.	Vitamin A (International Units) Per 100 gm.	Vitamin B1 (International Unit) Per 100 gms	Vitamin B2	Vitamin mgs. per 100 gm.
Cashewnut (kernels)	Anacardium occidentale.	5·90	21·20	46·90	2·40	1·30	22·30	0·05	0·45	5·00	596·3	100	Traces	Traces	Trace
Almond	*Amygdalus communis.*	5·23	20·75	58·92	2·90	1·70	10·50	0·225	0·492	3·47	655·3	...	80	...	...
Pistachio nut	*Pistaciavera* .	5·58	19·81	53·51	2·75	2·10	16·25	0·136	0·431	13·70	625·8	...	...	...	...
Walnut	*Jugalans regia* .	4·53	15·64	64·49	1·84	2·60	10·90	0·095	0·384	4·76	686·6	...	150	...	...
Groundnut	*Arachis hypogaea* .	7·92	26·72	40·13	1·87	3·07	20·29	0·048	0·392	1·56	549·2	63	300	Traces	...
Groundnut roasted	*Arachis hypogaea*	4·04	31·54	39·76	2·28	3·07	19·31	0·045	0·435	0·29	561·2	...	...	...	...

APPENDIX XXXII

Average monthly prices of raw cashewnut (Indian wholes) at Mangalore market during 1949-50 *to* 1952-53

(in rupees per standard maund)

Year	April	May	June	July	August	September	October	November	December	January	February	March	Average
1949-50	15	13	10	18	13	15	15	16	16	16	16	14	15
1950-51	16	17	17	20	22	23	22	20	23	23	23	21	21
1951-52	23	28	27	25	26	26	29	29	29	29	29	26	27
1952-53	29	28	32	34	34	34	34	34	34	34	27	25	33

Sources : Directorate of Economics and Statistics.

APPENDIX XXXIII

Average monthly prices of cashew kernels (wholes, American quality) at Bombay market during 1947-48 *to* 1952-53

(in rupees per standard maund)

Year	April	May	June	July	August	September	October	November	December	January	February	March	Average
1947-48	132	125	125	118	121	121	132	92	121	114	125	121	120
1948-49	132	151	129	132	132	132	136	132	132	132	143	151	136
1949-50	140	132	132	132	132	151	147	151	143	143	140	136	140
1950-51	136	136	145	145	152	147	158	154	158	151	152	180	151
1951-52	191	187	185	195	195	195	195	202	202	187	187	202	194
1952-53	198	206	220	206	..	217	217	217	217	..	..	..	212

Source : Marketing Research Officer Bombay.

APPENDIX XXXIV

Average monthly prices of cashew kernels (Indian wholes) at Bombay Market during 1947-48 to 1952-53

(in rupees per standard maund)

Year	April	May	June	July	August	September	October	November	December	January	February	March	Average
1947-48	79	86	92	92	104	99	96	101	88	97	92	98	93
1948-49	92	98	97	97	96	99	103	85	103	104	104	107	98
1949-50	92	97	92	89	89	110	103	96	93	96	90	90	94
1950-51	92	96	101	101	107	108	120	125	126	121	123	143	113
1951-52	129	140	143	147	130	130	121	147	147	143	143	191	143
1952-53	140	140	154	140	156	118	158	158	147	..	..	..	146

Source : Marketing Research Officer, Bombay.

APPENDIX XXXV

Quantity and value of lemon—grass oil exported from India to different countries of the world during 1937-39 and 1946-47 to 1952-53

Destination	Quantity (in gallons)								Value in thousand rupees							
	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1937-39 average	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53
EXPORT TO HARD CURRENCY AREAS.																
U. S. A.	32,840	75,808	36,957	N.A.	N.A.	N.A.	N.A.	2,13,640	2,508	6020·3	1420·0	N.A.	N.A.	N.A.	NA.	991·9
Canada	340	63	...	...	...	...	...	...	2·5	4·4	...	...	...	...	...	...
TOTAL	33,180	75,871	36,957	...	...	...	...	2,13,640	253·3	6024·7	1420·0	...	...	...	...	991·9
EXPORT TO STERLING AND OTHER AREAS																
U. K.	22,316	27,653	20,606	...	...	...	...	2,37,890	169·2	2345·7	1069·7	...	...	...	...	1097·3
Netherlands	10,043	2,777	3,956	...	...	...	...	13,440	80	240·9	170·8	...	...	...	...	56·6
France	7,562	10,144	11,006	...	...	...	...	6,720	60·2	884·8	437·2	...	...	...	...	31·2
Switzerland	...	13,033	7,997	...	...	...	...	44,655	...	1069·1	396·0	...	...	...	...	49·1
Australia	38	130	2,341	...	...	...	...	...	·3	10·1	94·6	...	...	...	...	...
Other foreign countries	2,093	2,682	1,190	...	...	...	...	3,31,064	155·4	218·9	68·1	...	...	...	...	1580·3
GRAND TOTAL in gallons	94,021	1,32,290	84,053	95,824	88,223	1,27,706	1,22,469	92,092	718·0	10795·1	3656·6	2407·7	4662·3	13264·4	14900·2	3917·1
In tons	375	528	335	382	352	513	488	378								
SHARE OF																
Bombay	...	314	66	N.A.	N.A.	N.A.	N A.	N.A.	...	25·4	2·4	N.A.	N.A.	N.A.	N.A.	N.A.
Madras	94,021	1,31,965	83,987	N.A.	N.A.	N.A.	N.A.	N.A.	718·0	10768·0	3654·1	N.A.	N.A.	N.A.	N.A.	N.A.
Bengal	94,021	11	...	N.A.	N.A.	N.A.	N.A.	N.A.	...	1·1	...	N.A.	N.A.	N.A.	N.A.	N.A.
GRAND TOTAL In gallons	4,021	132,,290	84,053	95,824	88,223	1,27,706	1,22,469	92,092	718·0	10795·1	3656·6	2407·7	4662·3	13264·4	14900·2	3917·1
IN POUND In tons	375	528	335	7,61,350 382	7,88,199 352	11,48,559 513	10,93,588 488	8,39,569 378								

Source: Accounts relating to foreign (Sea, Air & Land), Trade & Navigation of India.
N.A.—Not available.

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